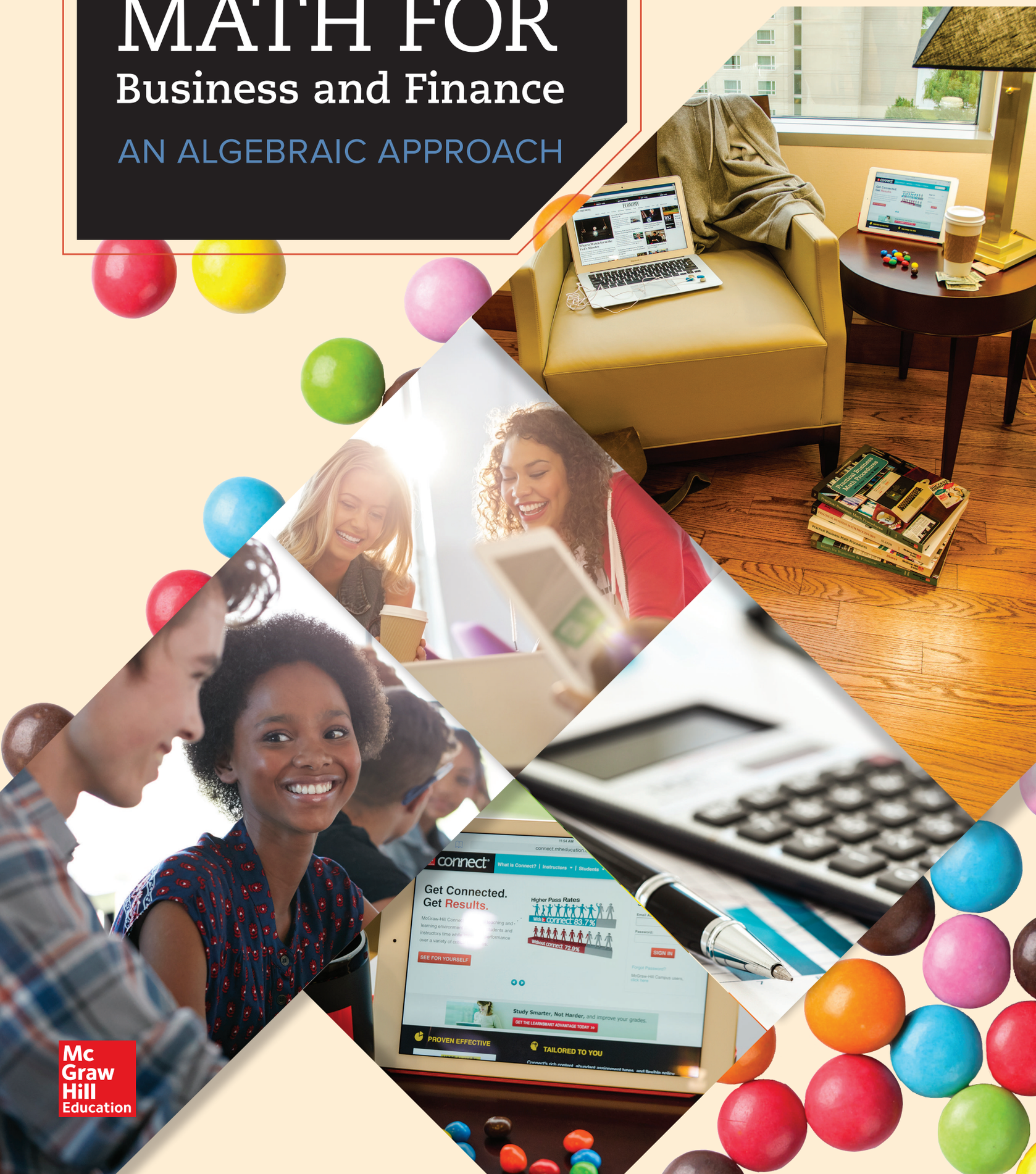
Jeffrey **Slater** Sharon M. **Wittry**

2e

MATH FOR
Business and Finance
AN ALGEBRAIC APPROACH



Mc Graw Hill Education

Math for Business and Finance

An Algebraic Approach

The McGraw-Hill/Irwin Series in Operations and Decision Sciences

Supply Chain Management

Benton
Purchasing and Supply Chain Management
Second Edition

Burt, Petcavage, and Pinkerton
Supply Management
Eighth Edition

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Supply Chain Logistics Management
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Eighth Edition

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Sixth Edition

Jaggia and Kelly
Business Statistics: Communicating with Numbers
Third Edition

Lind, Marchal, and Wathen
Basic Statistics for Business and Economics
Ninth Edition

Lind, Marchal, and Wathen
Statistical Techniques in Business and Economics
Seventeenth Edition

Math for Business and Finance

An Algebraic Approach

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Dedication

With love ♥ to Fejjie, our new puppy!
—Jeff

For my amazing and wonderful grandchildren,
H and Toad. Love you guys!
—Sharon

Note to Students

ROADMAP TO SUCCESS

How to use this book and the Total Slater/Wittry Learning System.

Step 1: **Each chapter is broken down into Learning Units. Read and master one Learning Unit at a time.**

How do I know whether I understand it?

- Try the practice quiz. All the worked-out solutions are provided.
- For more practice, try the extra practice quiz. Worked-out solutions are in Appendix B.

Once you feel confident with the subject matter, go on to the next Learning Unit in the chapter.

Step 2: **Review the Interactive Chapter Organizer at the end of the chapter.**

How do I know if I understand it?

- The third column, "You try it," gives you the chance to do additional practice.

Step 3: **Do assigned problems at the end of the chapter (or Appendix A). These may include discussion questions, drill, word problems, challenge problems, video cases, as well as projects from Surf to Save and *Kiplinger*'s magazine.**

Can I check my homework?

- Appendix C has check figures for all the odd-numbered problems.

Step 4: **Take the Summary Practice Test.**

Can I check my progress?

- Appendix C has check figures for all problems.

To aid you in studying the book, we have developed the following color code:

Blue: Movement, cancellations, steps to solve, arrows, blueprints

Purple and yellow: Formulas and steps

Green: Tables and forms

Red: Key items we are solving for

If you have difficulty with any text examples, pay special attention to the red and the blue. These will help remind you of what you are looking for as well as what the procedures are.

FEATURES

The following are the features students have told us have helped them the most.

Blueprint Aid Boxes

For the first four chapters, blueprint aid boxes are available to help you map out a plan to solve a word problem. We know the harder thing to do in solving word problems is often figuring out where to start. Use the blueprint as a model to get started.

Interactive Chapter Organizer

At the end of each chapter is a quick reference guide called the Interactive Chapter Organizer, in which key points, formulas, and examples are provided. A list of vocabulary terms is also included, as well as Check Figures for Extra Practice Quizzes. A column called "You Try It" gives you a chance to do additional practice. And solutions are provided in Appendix B. (A complete glossary is found at the end of the text.) Think of the Interactive Chapter Organizer as your set of notes and use it as a reference when doing homework problems and reviewing before exams.

The Business Math Website

Log in to your Connect course or visit the Student Resource page at **mhhe.com/slater2e** and find the Internet Resource Guide with hot links, tutorials, practice quizzes, Excel® workbook and templates, and other study materials useful for the course.

Video Cases

There are six video cases applying business math concepts to real companies such as Six Flags, Subaru of Indiana Automotive, EDP Renewables, Noodles & Company, Buycostume.com, and DHL. You can watch these videos in Connect. Some background case information and assignment problems incorporating information on the companies are included at the end of Chapters 3, 8, 11, 12, 13, and 20.

Formula Insert Card

The formula insert card serves as a quick reference guide to students as they study for exams or work through the text problems.

Surf to Save

At the end of each chapter you will find word problems with links to sites and publications. These problems give you a chance to apply the theory provided in the chapter to the real world. And "Your Personal Financial Plan" will assist you with reaching a healthy financial future. Put your math skills to work.

Group Activity: Personal Finance, a Kiplinger Approach

In each chapter you can debate a business math issue based on a *Kiplinger's Personal Finance* magazine article. This is great for critical thinking, as well as improving your writing skills.

Spreadsheet Templates

Excel® templates are available for selected end-of-chapter problems. You can run these templates as-is or enter your own data. The templates also include an interest table feature that enables you to input any percentage rate and any terms. The program then generates table values for you.

Cumulative Review

At the end of Chapter 20 are word problems that test your retention of business math concepts and procedures. Check Figures for *all* cumulative review problems are in Appendix C.

Vocabulary

Each chapter opener includes a Vocabulary Preview covering the key terms in the chapter. The Interactive Chapter Organizer includes page references to the terms. There's also a glossary at the end of the text.

A BIG THANK YOU FROM JEFF AND SHARON TO ALL OUR LOYAL CUSTOMERS!

Now updated based on your feedback! We are excited about this new edition of *Math for Business and Finance: An Algebraic Approach*. And, we hope you enjoy it as much as we do. This text provides a solution to teaching and learning business math using algebra. There are no tables used in the solutions. A calculator is the only thing needed to solve each problem, providing students with a lifelong tool.

Need help?

Jeff Slater
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- **781-910-5875 (cell phone)**

Sharon Wittry
- **sharonwittry@yahoo.com**
- **719-323-1243 (cell phone)**

Customer Service at 1-800-338-3987

Our promise to you: We will respond to your needs within 24 hours.

BEHIND THE SCENES WITH JEFF AND SHARON: Preparing this edition

What did we like best about doing this revision?

Jeff: After teaching Business Math at North Shore Community College for 47 years, Jeff still wakes up at 5 o'clock every morning with his dogs Bernie and Fejjie to get *The Wall Street Journal* so he can find new clips that reflect what is happening with today's economy.

Sharon: Teaching at Pikes Peak Community College for 20 years allows Sharon the opportunity to test-market new ideas and concepts with her students. She wakes at 6 A.M. and takes her Labs, Remington and Wilson, for a bike ride to help her plan the writing day focusing on how to simplify difficult topics and create new teaching techniques that motivate students.

Our PASSION is to serve our students and instructors. As instructors who continue to use ALEKS and Connect in our classrooms, we know what you and your students need. Being number one in this market is a huge responsibility that we do not take lightly. We work on our books 365 days a year. This is our baby and we love doing it.

Best,

Jeffrey Slater **Sharon Wittry**

Highlights of Changes for 2e: A Transition Guide for All Our Loyal Adopters

All Chapters

- New chapter openers with new *Wall Street Journal* clips
- Each learning unit updated with new *Wall Street Journal* clips
- New "Aha!" icons that focus attention on reviewing learning unit
- New "Your Personal Financial Plan" feature at end of each chapter
- New real-world problems added to end-of-chapter problem material
- New *Kiplinger* articles at end of each chapter
- Updated Surf to Save projects
- Updated technology and trends

Chapter 1 Problem Solving with Math

- New currency table with clearer explanation

Chapter 3 Percents and Their Applications

- New discussion of percent increase and decrease

Chapter 4 Solving for the Unknowns

- More real-world applications

Chapter 5 Business Statistics

- Update of technology and relevant statistics

Chapter 6 Banking and Budgeting

- Use of banking apps in mobile banking

Chapter 7 Payroll and Income Tax

- New payroll tables
- New Social Security rates
- New federal unemployment rate

Chapter 9 Risk Management

- Latest updates in insurance coverages

Chapter 10 Installment Buying and Revolving Charge Credit Cards

- Update in borrowing regulations

Chapter 11 Discounts: Trade and Cash

- New discussions of using Internet to get discounts

Chapter 13 How to Read, Analyze, and Interpret Financial Reports

- Insight into new revenue recognition regulation for 2018

Chapters 16–17, 19–20 Simple Interest; Promissory Notes, Simple Discount Notes, and the Discount Process; Compound Interest and Present Value; Annuities and Sinking Funds

- Latest trends in borrowing with current rates

Chapter 18 The Cost of Home Ownership

- Latest trends in the housing market

Chapter 21 Stocks, Bonds, and Mutual Funds

- New updates in stock quotations

Highlights of the Text

All chapters

- Two-page openers with vocabulary preview
- Clips and cartoons within learning units
- Real-world word problems
- Money Tips in each learning unit
- Challenge problems
- *Kiplinger's* Business Math Issue
- Surf to Save projects
- Your Personal Financial Plan
- Interactive chapter organizer

"Aha!" icons focus attention by identifying important information in the learning units.

"Go figure" icons provide a step-by-step solution strategy for solving problems using both scientific and financial calculators, therefore simplifying the processes being learned.

Global issues are interspersed throughout the text demonstrating the value of understanding the world we live in. For example, Chapter 1 presents foreign currencies which allow students the opportunity to work with exchange rates.

The latest trends in technology are presented throughout the text. Technology has become a critical part of our business and personal lives making new technologies an important part of any business text. Up-to-date, real-world applications of technology are included, as well as discussions on ways to save money and time.

Current issues affecting our livelihood such as the advent of historically high bankruptcies and short sales in many cities and states are discussed.

Video cases appear at the end of Chapters 3, 8, 11, 12, 13, and 20.

Technology

- Connect and LearnSmart are available. See pages xx-xxi or check with your McGraw-Hill Education sales representative for details.
- Video cases and Surf to Save content
- Comprehensive Instructor Resource Library in Connect

The Wall Street Journal Highlights

With over 100 clippings from *The Wall Street Journal,* students can see the relevance of text topics to the business world.

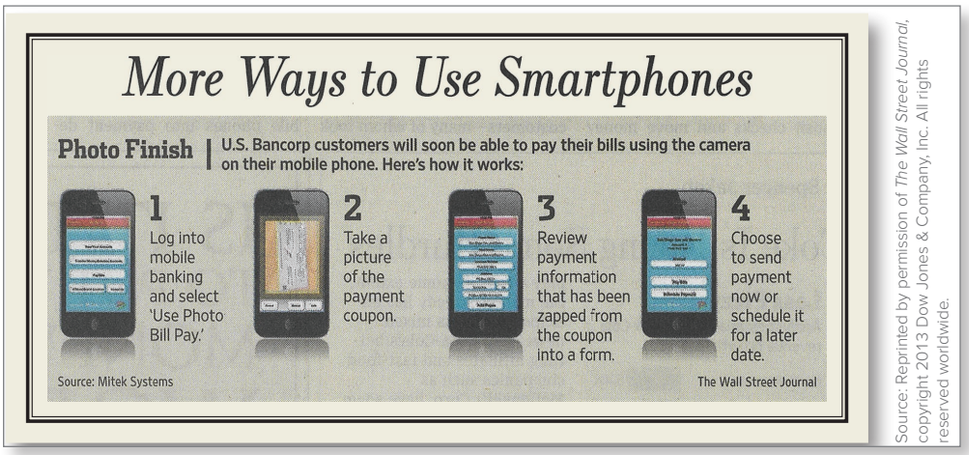
Kiplinger's Personal Finance Magazine Articles

These articles were completely updated this edition and include:

1. Plastic Perks (Chapter 1)
2. What You Need to Know about Tech Warranties (Chapter 2)
3. A Crash Course in Money Management (Chapter 3)
4. Cash Out Your Lease (Chapter 4)
5. Make Long-Term Care More Affordable (Chapter 5)
6. Savings Account/A Do-It-All Bank (Chapter 6)
7. Navigating Social Security (Chapter 7)
8. Tax Breaks for the Middle Class (Chapter 8)
9. 3 Simple Steps: Reshop Your Car Insurance (Chapter 9)
10. Merging Your Money (Chapter 10)
11. Higher Rates on Store Cards (Chapter 11)
12. What You Need to Know about Online Pricing (Chapter 12)
13. The Pros and Cons of Cheap Oil (Chapter 13)
14. Expect Deals on New Models (Chapter 14)
15. Retailers Ramp Up Holiday Deliveries (Chapter 15)
16. A Boomer Business (Chapter 16)
17. Game Plan: "What's the best way to lend money to a family member (and not get burned)?" (Chapter 17)
18. Reverse Mortgages with a Twist (Chapter 18)
19. A Barber on the Cutting Edge (Chapter 19)
20. What You Need to Know about Funding IRAs (Chapter 20)
21. A Top Strategist Says Trouble Is Looming (Chapter 21)

Real-World Applications

In response to instructor feedback, this text includes references to companies such as Google, Starbucks, Twitter, Amazon, Facebook, and Walmart to illustrate chapter topics. Over 100 actual clippings from *The Wall Street Journal* and 21 *Kiplinger's Personal Finance* magazine articles give students a more complete view of real-world practices from the business press.



More Ways to Use Smartphones

Photo Finish | U.S. Bancorp customers will soon be able to pay their bills using the camera on their mobile phone. Here's how it works:

1 Log into mobile banking and select 'Use Photo Bill Pay.'

2 Take a picture of the payment coupon.

3 Review payment information that has been zapped from the coupon into a form.

4 Choose to send payment now or schedule it for a later date.

Source: Mitek Systems

The Wall Street Journal

PERSONAL FINANCE

By Susannah Snider, From *Kiplinger's Personal Finance*, September 2013

A KIPLINGER APPROACH

COLLEGE »

A Crash Course in Money Management

Give students the tools they need to master their finances. BY SUSANNAH SNIDER

WHEN IT COMES TO BANK accounts, the cost of newbie mistakes adds up fast. For example, overdraft charges, at about $35 a pop, can quickly put your freshman in the hole. But parents can help students make smart choices about overdraft programs, plus steer them to accounts that don't charge maintenance or low-balance fees. You can also help them set up text alerts so they don't miss a payment or overdraw. "The experience of banking wisely is something you can learn in college without paying for the course," says Richard Barrington, of MoneyRates.com.

Checking. Free checking is quickly becoming ancient history, but some banks still waive fees for students. **U.S. BANK** and **CITIBANK** offer free student checking and allow free out-of-network ATM withdrawals (though U.S. Bank limits them to four per month, and outside banks may charge their own ATM fees). **BANK OF AMERICA** also offers free checking. After graduation these banks funnel you into non-student accounts. Other banks waive fees if you, for example, maintain a minimum balance or make one direct deposit each month.

Overdraft charges are a big drain on young-adult accounts. If you opt in and use your debit card or go to the ATM without cash in your account to cover the transaction, the bank fronts you the money—but you pay a stiff penalty. Many banks let you link a checking account to savings as a backup, typically for a fee of about $10 per transfer if you overdraw. Or you can simply choose to let the transaction be declined. Embarrassment at the register can be a powerful motivator to improve balance tracking.

©Jupiter Images/Brand X/Alamy

Savings. Online banks usually offer better interest rates than the big brick-and-mortar banks. **BARCLAYS** online bank recently offered 0.9% on savings with no minimum balance or fees, and **ALLY BANK** paid 0.84% with no minimum or fees. If self-control is an issue, try stashing money in a separate bank. Otherwise, "it's too easy to click a button and move your money from savings to checking," says Erin Baehr, of Baehr Family Financial.

Credit. Make a judgment call on credit cards. Having one can help students improve their credit score, learn to manage debt and pay for emergencies. But a debit card is better for spendthrifts and those perfecting money skills. Plus, the feds have made it tough for applicants younger than 21 years old to qualify, requiring that they have an income or enlist a co-signer. If you co-sign, you may be stuck holding the bill or sacrificing your credit rating if your student can't pay.

If a credit card is right, look for one targeted to students. The **BANKAMERICARD CREDIT CARD FOR STUDENTS** carries no annual fee. Applicants younger than 21 must demonstrate the ability to pay based on income, such as earnings from summer or part-time jobs, or apply with a co-signer. ■

STUDENT-FRIENDLY APPS

ATMs. Using an out-of-network ATM will ding you more than $4, on average, according to a Bankrate.com survey. Dodge the fee with MasterCard's **ATM HUNTER.** Plug in your address or let the GPS pinpoint your location. You'll see a list of nearby ATMs and their affiliated banks. Free for iPhone, Android and Windows Phone.

Budgeting. The **LEARNVEST** app syncs with LearnVest's Money Center to help you track spending, save for goals and find financial tips. It's known for being geared toward women, but guys can use it, too. Free for iPhone.

Saving. Automate saving with **SAVED PLUS.** The app funnels a percentage of each purchase from a checking account into a savings account. Specify a goal, such as building an emergency fund or paying off a loan, plus the percentage of spending to set aside. Free for iPhone and Android.

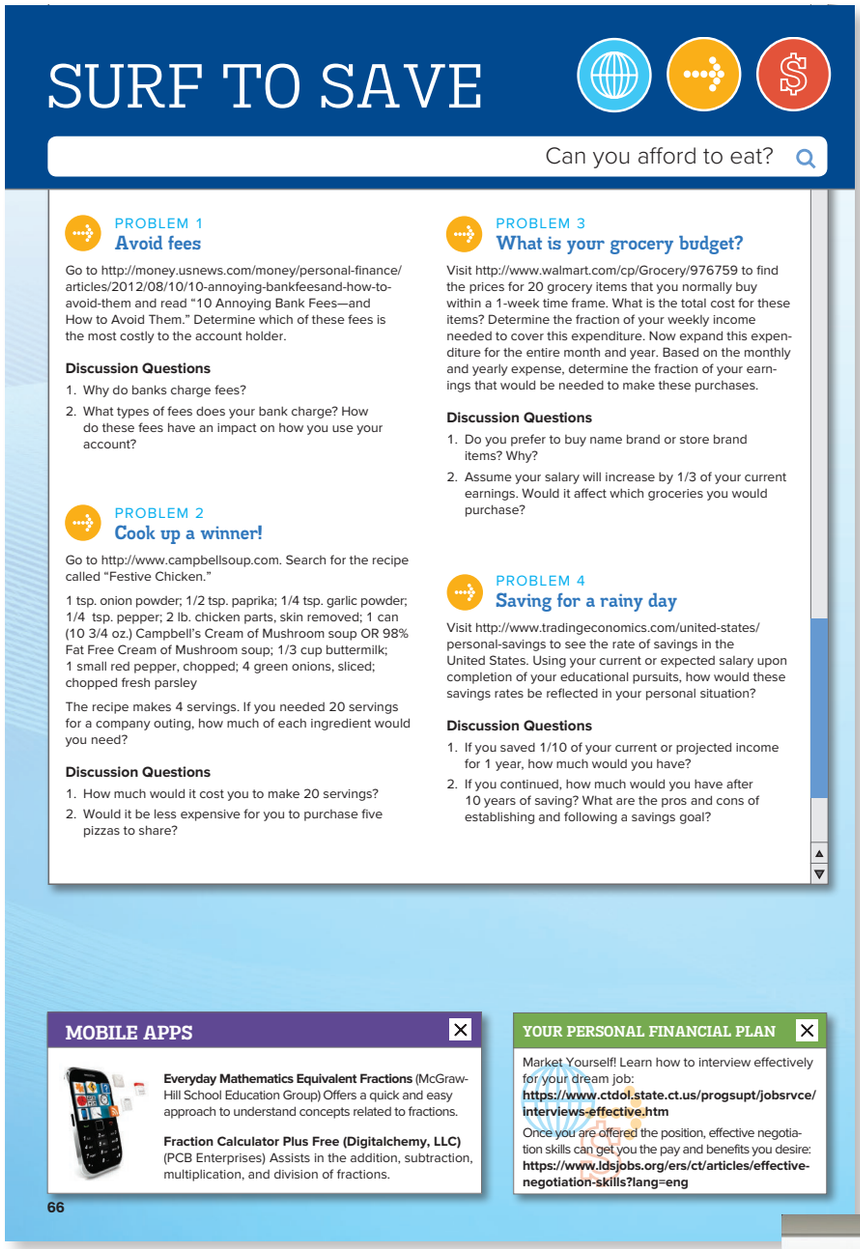
BUSINESS MATH ISSUE

.9% or .84% on savings is way too low in today's marketplace.

1. List the key points of the article and information to support your position.
2. Write a group defense of your position using math calculations to support your view.

Features of the Text

These features use technology to engage and motivate students to better understand business math. Our goal was to make this text as motivating and understandable as possible for both the just-out-of-high-school student as well as the returning student.



SURF TO SAVE

Can you afford to eat?

PROBLEM 1
Avoid fees

Go to http://money.usnews.com/money/personal-finance/articles/2012/08/10/10-annoying-bankfeesand-how-to-avoid-them and read "10 Annoying Bank Fees—and How to Avoid Them." Determine which of these fees is the most costly to the account holder.

Discussion Questions

1. Why do banks charge fees?
2. What types of fees does your bank charge? How do these fees have an impact on how you use your account?

PROBLEM 2
Cook up a winner!

Go to http://www.campbellsoup.com. Search for the recipe called "Festive Chicken."

1 tsp. onion powder; 1/2 tsp. paprika; 1/4 tsp. garlic powder; 1/4 tsp. pepper; 2 lb. chicken parts, skin removed; 1 can (10 3/4 oz.) Campbell's Cream of Mushroom soup OR 98% Fat Free Cream of Mushroom soup; 1/3 cup buttermilk; 1 small red pepper, chopped; 4 green onions, sliced; chopped fresh parsley

The recipe makes 4 servings. If you needed 20 servings for a company outing, how much of each ingredient would you need?

Discussion Questions

1. How much would it cost you to make 20 servings?
2. Would it be less expensive for you to purchase five pizzas to share?

PROBLEM 3
What is your grocery budget?

Visit http://www.walmart.com/cp/Grocery/976759 to find the prices for 20 grocery items that you normally buy within a 1-week time frame. What is the total cost for these items? Determine the fraction of your weekly income needed to cover this expenditure. Now expand this expenditure for the entire month and year. Based on the monthly and yearly expense, determine the fraction of your earnings that would be needed to make these purchases.

Discussion Questions

1. Do you prefer to buy name brand or store brand items? Why?
2. Assume your salary will increase by 1/3 of your current earnings. Would it affect which groceries you would purchase?

PROBLEM 4
Saving for a rainy day

Visit http://www.tradingeconomics.com/united-states/personal-savings to see the rate of savings in the United States. Using your current or expected salary upon completion of your educational pursuits, how would these savings rates be reflected in your personal situation?

Discussion Questions

1. If you saved 1/10 of your current or projected income for 1 year, how much would you have?
2. If you continued, how much would you have after 10 years of saving? What are the pros and cons of establishing and following a savings goal?

MOBILE APPS

Everyday Mathematics Equivalent Fractions (McGraw-Hill School Education Group) Offers a quick and easy approach to understand concepts related to fractions.

Fraction Calculator Plus Free (Digitalchemy, LLC) (PCB Enterprises) Assists in the addition, subtraction, multiplication, and division of fractions.

YOUR PERSONAL FINANCIAL PLAN

Market Yourself! Learn how to interview effectively for your dream job: **https://www.ctdol.state.ct.us/progsupt/jobsrvce/interviews-effective.htm**

Once you are offered the position, effective negotiation skills can get you the pay and benefits you desire: **https://www.ldsjobs.org/ers/ct/articles/effective-negotiation-skills?lang=eng**

66

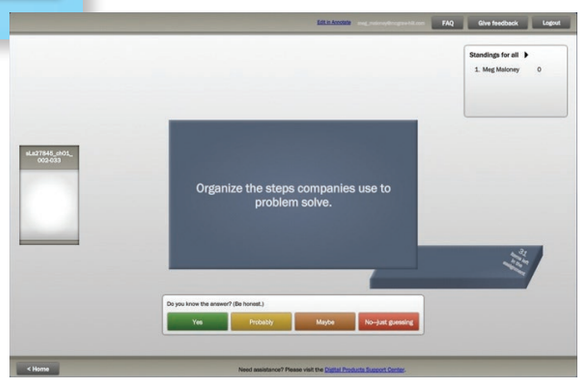
Surf to Save

Four Internet exercises appear at the end of every chapter. These exercises allow students to make use of the Internet's many resources, while encouraging them to apply the chapter material to their own lives. Discussion questions are also available for each Internet exercise so that instructors can engage students in conversations concerning the business math material and its application to their lives.

Your Personal Financial Plan

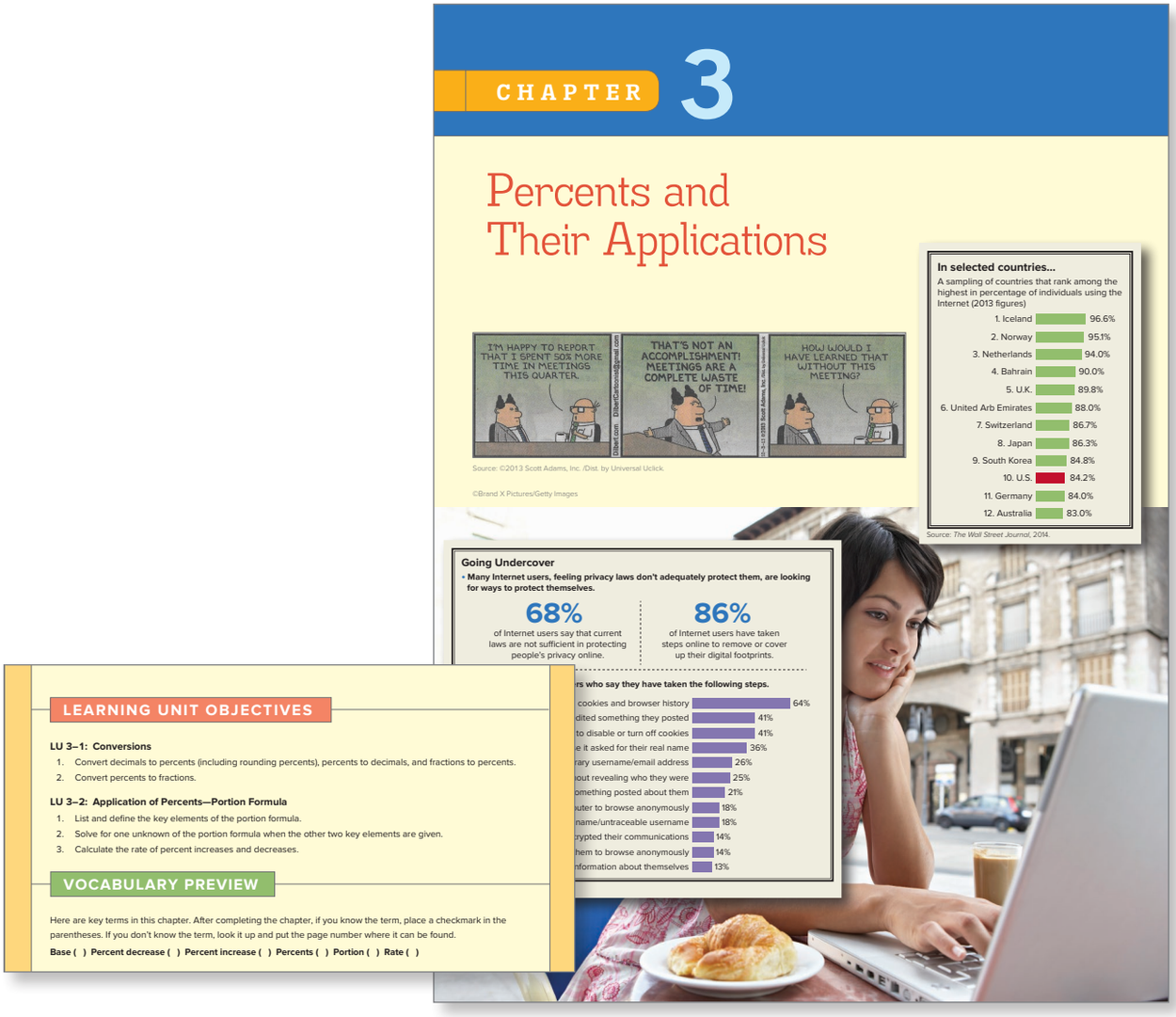
Tips for creating a personal financial plan are included with each chapter.

LearnSmart Intelligent flashcards improve the study experience by personalizing the content for each individual student. Instructors can see real-time performance across the class.



Chapter Openers

Chapter openers introduce students to the chapter's topics, and Learning Objectives for each unit provide an overview of the key material that will be covered. Students can see the real-world applications of business math through *The Wall Street Journal* clips, which make the topics relevant to them.

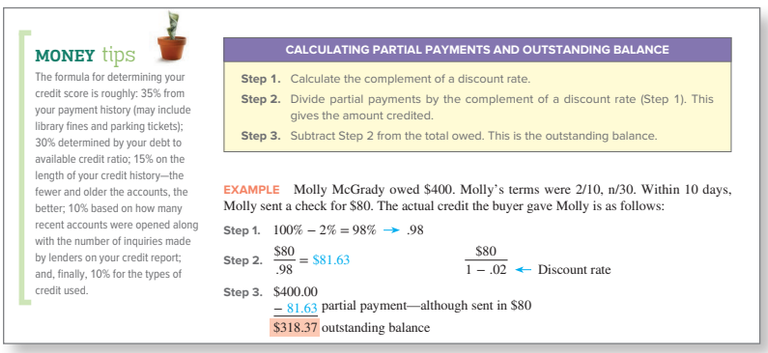


CHAPTER 3

Percents and Their Applications

Money Tips

A Money Tip is included with each Learning Unit to help students find practical ways to work with their money.



MONEY tips

The formula for determining your credit score is roughly: 35% from your payment history (may include library fines and parking tickets); 30% determined by your debt to available credit ratio; 15% on the length of your credit history—the fewer and older the accounts, the better; 10% based on how many recent accounts were opened along with the number of inquiries made by lenders on your credit report; and, finally, 10% for the types of credit used.

CALCULATING PARTIAL PAYMENTS AND OUTSTANDING BALANCE

Step 1. Calculate the complement of a discount rate.
Step 2. Divide partial payments by the complement of a discount rate (Step 1). This gives the amount credited.
Step 3. Subtract Step 2 from the total owed. This is the outstanding balance.

EXAMPLE Molly McGrady owed $400. Molly's terms were 2/10, n/30. Within 10 days, Molly sent a check for $80. The actual credit the buyer gave Molly is as follows:

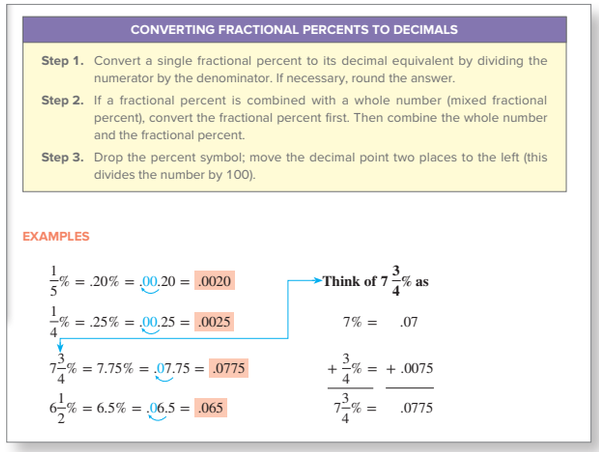
Step 1. $100\% - 2\% = 98\% \rightarrow .98$

Step 2. $\frac{\$80}{.98} = \$81.63$ $\qquad \frac{\$80}{1 - .02}$ ← Discount rate

Step 3. $400.00
$- 81.63$ partial payment—although sent in $80
$318.37 outstanding balance

Clear Explanations

Explanations are given in a step-by-step format that is easy to follow and remember, followed by understandable examples.



CONVERTING FRACTIONAL PERCENTS TO DECIMALS

Step 1. Convert a single fractional percent to its decimal equivalent by dividing the numerator by the denominator. If necessary, round the answer.

Step 2. If a fractional percent is combined with a whole number (mixed fractional percent), convert the fractional percent first. Then combine the whole number and the fractional percent.

Step 3. Drop the percent symbol; move the decimal point two places to the left (this divides the number by 100).

EXAMPLES

$\frac{1}{5}\% = .20\% = .00.20 = .0020$

$\frac{1}{4}\% = .25\% = .00.25 = .0025$

$7\frac{3}{4}\% = 7.75\% = .07.75 = .0775$

$6\frac{1}{2}\% = 6.5\% = .06.5 = .065$

Think of $7\frac{3}{4}\%$ as

$7\% = .07$

$+\frac{3}{4}\% = +.0075$

$7\frac{3}{4}\% = .0775$

Functional Use of Color

While many books use color, we use color to teach. We personally color-code each element to enhance the learning process. For example, when a student sees a number in red, they know it is a key item they are solving for.

Color Key

- **Blue:** Movement, cancellations, steps to solve, arrows, blueprints
- **Purple and yellow:** Formulas and steps
- **Green:** Tables and forms
- **Red:** Key items we are solving for
- **Magenta:** Worked-out solutions in Teacher's Edition only

Practice Quizzes and Extra Practice Quizzes

Practice Quizzes follow each Learning Unit in the book. These quizzes provide immediate feedback for students to check their progress. Extra Practice Quizzes follow the Practice Quizzes. Check figures are included at the bottom of the Interactive Chapter Organizer.

LU 8–2 PRACTICE QUIZ

Complete this **Practice Quiz** to see how you are doing.

From the following facts: (1) calculate the assessed value of Bill's home; (2) calculate the tax rate for the community in decimal (to the nearest ten thousandth); (3) convert the decimal to **(a)** %, **(b)** per $100 of assessed value, **(c)** per $1,000 of assessed value, and **(d)** in mills (to the nearest hundredth); and (4) calculate the property tax due on Bill's home in decimal, per $100, per $1,000, and in mills.

Given

Assessed market value	40%	Total budget needed	$ 176,000
Market value of Bill's home	$210,000	Total assessed value	$1,910,000

LU 8–2a EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer). Worked-out solutions can be found in Appendix B at end of text.

From the following facts: (1) calculate the assessed value of Bill's home; (2) calculate the tax rate for the community in decimal (to the nearest ten thousandth); (3) convert the decimal to **(a)** %, **(b)** per $100 of assessed value, **(c)** per $1,000 of assessed value, and **(d)** in mills (to the nearest hundredth); and (4) calculate the property tax due on Bill's home in decimal, per $100, per $1,000, and in mills.

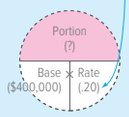
Given

Assessed market value	40%	Total budget needed	$ 159,000
Market value of Bill's home	$150,000	Total assessed value	$1,680,000

Blueprint Aid for Dissecting and Solving a Word Problem

Students need help in overcoming their fear of word problems. The first four chapters provide a "blueprint" format for solving word problems. It shows students how to begin the problem-solving process, gets them actively involved in dissecting the word problem, shows visually what has to be done before calculating, and provides a structure for them to use.

The Word Problem Sales of Milk Chocolate M&M'S® are 80% of the total M&M'S® sales. Total M&M'S® sales are $400,000. What are the sales of Peanut M&M'S®?

BLUEPRINT	The facts	Solving for?	Steps to take	Key points
	Milk Chocolate M&M'S® sales: 80%. *Total M&M'S® sales:* $400,000.	Sales of Peanut M&M'S®.	Identify key elements. *Base:* $400,000. *Rate:* .20 (100% – 80%). *Portion:* ? Rate × Base = Portion, or $R \times B = P$.	If 80% of sales are Milk Chocolate M&M'S, then 20% are Peanut M&M'S®.  Portion and rate must relate to same piece of base.

Steps to solving problem

1.	Set up the formula.	Rate × Base = Portion $R \times B = P$
2.	Calculate portion (sales of Milk Chocolate M&M'S®).	80% of $400,000 = P .8 × $400,000 = $320,000

Interactive Chapter Organizer

This quick reference guide provides students with a complete set of notes, including color coding consistent with the text. Key points, formulas, examples, vocabulary, and Check Figures for the Extra Practice Quizzes are included. A "You try it" column gives students the chance to do additional practice. This tool is useful as a reference for students as well as for reviews before exams.

INTERACTIVE CHAPTER ORGANIZER

Topic/procedure/formula	Examples	You try it*
Calculating monthly payment using a formula $PMT = \frac{PV(i)}{1 - \frac{1}{(1+i)^N}}$	$180,000 mortgage at 4% for 30 years: $\frac{\$180{,}000(.00333333)}{1 - \frac{1}{(1+.00333333)^{360}}} = \$859.35$	**Calculate monthly payment** Using the formula: $220,000 mortgage at 3.5% for 15 years
Calculating monthly payment using a financial calculator Enter N, I/Y, PV, FV, CPT PMT	$180,000 at 4% for 30 years. Monthly payment: N: 360; I/Y: 4/12 = .33333333; PV: 180,000; CPT PMT: –859.35; FV: 0	**Calculate monthly payment** Using a financial calculator: $220,000 mortage at 3.5% for 15 years
Calculating total interest cost Total of all monthly payments – Amount of mortgage	Using example above: 30 years = 360 (payments) 360 payments × $859.35 = $309,366 – $180,000 = $129,366 (mortgage interest over the life of mortgage)	**Calculate total interest cost** Use the data from the problem above.
Amortization schedule $I = P \times R \times T$ $\left(I \text{ for month} = P \times R \times \frac{1}{12}\right)$ Principal reduction = Monthly payment – Interest New principal = Current principal – Reduction of principal	Using same example: Portion to— Principal; Interest; Principal reduction; Balance of principal Principal $180,000; Interest $600.00 ($180,000 × .04 × 1/12); Principal reduction $259.35 ($859.35 – $600.00); Balance of principal $179,740.65 ($180,000 – $259.35) $179,740.65; $599.14 ($179,740.65 × .04 × 1/12); $260.21 ($859.35 – $599.14); $179,480.44 ($179,740.65 – $260.21)	**Prepare amortization for first two payments** Use the data from the problem above.

Critical Thinking Discussion Questions with Chapter Concept Check

These thought-provoking questions follow the Interactive Chapter Organizer and are designed to get students thinking about the larger picture and the "why's" of business math. They go beyond the typical questions by asking students to explain, define, create, and so forth. The Chapter Concept Check questions let students find creative solutions to theory learned in the chapter.

Critical Thinking Discussion Questions with Chapter Concept Check

1. Explain the structure of a check. The trend in bank statements is not to return the canceled checks. Do you think this is fair?
2. List the three types of endorsements. Endorsements are limited to the top $1\frac{1}{2}$ inches of the trailing edge on the back left side of your check. Why do you think the Federal Reserve made this regulation?
3. List the steps in reconciling a bank statement. Today, many banks charge a monthly fee for certain types of checking accounts. Do you think all checking accounts should be free? Please explain.
4. What are some of the trends in mobile banking? Will we become a cashless society in which all transactions are made with some type of credit card?
5. What do you think of the government's intervention in trying to bail out banks? Should banks be allowed to fail?
6. **Chapter Concept Check.** Create your own company and provide needed data to prepare a bank reconciliation. Then go to a bank website and explain how you would use the bank's app versus the manual system of banking.

Photos

More than 50 photos are included to stimulate student interest and help students see business math with imagination and enthusiasm. Whether showing McDonald's in Asia, inventory systems, or online banking and bill paying, these photos bring business math to life.

The merchandise sold by retailers is bought from manufacturers and wholesalers who sell only to retailers and not to customers. These manufacturers and wholesalers offer retailer discounts so retailers can resell the merchandise at a profit. The discounts are off the manufacturers' and wholesalers' **list price** (suggested retail price), and the amount of discount that retailers receive off the list price is the **trade discount amount.** The website of The Krazy Coupon Lady (illustration below) shows how consumers can get digital coupons. Keep in mind that retailers can track customer purchases and preferences. The smartphone is a great tool customers can use to find discounts—and retailers can use to gather marketing data.

©iPhone/Alamy

When you make a purchase, the retailer (seller) gives you a purchase **invoice.** Invoices are important business documents that help sellers keep track of sales transactions and buyers keep track of purchase transactions. North Shore Community College Bookstore is a retail seller of textbooks to students. The bookstore usually purchases its textbooks directly from publishers. Figure 11.1 shows a sample of what a textbook invoice from McGraw-Hill/Irwin Publishing Company to the North Shore Community College Bookstore would look like. Note that the trade discount amount is given in percent. This is the **trade discount rate,** which is a percent

End-of-Chapter Problems

At the end of each chapter, Drill Problems are followed by Word Problems. Some problems use material from newspapers such as *The New York Times* to help students see the relevance of the material.

An Excel logo next to a problem indicates an Excel template is available on the Student Resource page and in the Excel Workbook to help solve that problem.

Challenge Problems let your students stretch their understanding and ability to solve more complex problems. We've included two per chapter. A Summary Practice Test concludes the problem section and covers all the Learning Objectives in the chapter.

Drill Problems

7

END-OF-CHAPTER PROBLEMS connect plus+ www.mhhe.com/slater2e

Check figures for odd-numbered problems in Appendix C. Name _____ Date _____

DRILL PROBLEMS

Complete the following table: *LU 7-1(1)*

	Employee	M	T	W	Th	F	Hours	Rate per hour	Gross pay
7–1.	Roger Rial	11	6	9	7	6		$7.95	
7–2.	Kristina Shaw	5	9	10	8	8		$8.10	

Complete the following table (assume the overtime for each employee is a time-and-a-half rate after 40 hours): *LU 7-1(2)*

	Employee	M	T	W	Th	F	Sa	Total regular hours	Total overtime hours	Regular rate	Overtime rate	Gross earnings
7–3.	Blue	12	9	9	9	9	3			$8.00		
7–4.	Tagney	14	8	9	9	5	1			$7.60		

Calculate gross earnings: *LU 7-1(3)*

	Worker	Number of units produced	Rate per unit	Gross earnings
7–5.	Lang	480	$3.50	
7–6.	Swan	846	$ .58	

Word Problems

WORD PROBLEMS

7–22. Lai Xiaodong, a 22-year-old college-educated man, accepted a job at Foxconn Technology (where the iPad was being produced for Apple) in Chengdu, China, for $22 a day at 12 hours a day, 6 days a week. A company perk included company housing in dorms for the 70,000 employees. It was common for 20 people to be assigned to the same three-bedroom apartment. What were Lai's hourly (rounded to the nearest cent), weekly, and annual gross pay? *LU 7-1(1)*

7–23. Through the classifieds of the *Miami Herald* Rhonda Brennan found her first job after graduating from college. She was delighted when the offer came through at $18.50 per hour. She completed her W-4 stating that she is married with a child and claims an allowance of 3. Her company will pay her biweekly for 80 hours. Calculate her take-home pay for her first check. *LU 7-2(1)*

Challenge Problems

CHALLENGE PROBLEMS

7–35. The San Bernardino County Fair hires about 150 people during fair time. Their wages range from $6.75 to $8.00. California has a state income tax of 9%. Sandy Denny earns $8.00 per hour; George Barney earns $6.75 per hour. They both worked 35 hours this week. Both are married; however, Sandy claims 2 exemptions and George claims 1 exemption. Assume a rate of 6.2% on $118,500 for Social Security and 1.45% for Medicare. **(a)** What is Sandy's net pay after FIT (use the tables in the text), Social Security tax, state income tax, and Medicare have been taken out? **(b)** What is George's net pay after the same deductions? **(c)** How much more is Sandy's net pay versus George's net pay? Round to the nearest cent. *LU 7-2(1)*

Summary Practice Test

SUMMARY PRACTICE TEST

1. Calculate Sam's gross pay (he is entitled to time-and-a-half for overtime hours worked). *LU 7-1(2)*

M	T	W	Th	F	Total hours	Rate per hour	Gross pay
$9\frac{1}{4}$	$9\frac{1}{4}$	$10\frac{1}{2}$	$8\frac{1}{2}$	$11\frac{1}{2}$		$8.00	

2. Mia Kaminsky sells shoes for Macy's. Macy's pays Mia $12 per hour plus a 5% commission on all sales. Assume Mia works 37 hours for the week and has $7,000 in sales. What is Mia's gross pay? *LU 7-1(3)*

Personal Finance: A Kiplinger Approach

A Kiplinger Group Project at the end of each chapter includes an article from *Kiplinger's Personal Finance* magazine. Each article presents a business math issue for students to debate and solve. Suggested answers are located in the Instructor's Resource Manual. This is an excellent tool to develop critical thinking and writing skills. It also provides opportunities for students to become involved in team projects. As stated in the AMATYC standards: "mathematics faculty will foster interactive learning through student writing, reading, speaking, and collaborative activities so that students can learn to work effectively in groups and communicate about mathematics both orally and in writing."

PERSONAL FINANCE

A KIPLINGER APPROACH

Source: By Patricia Mertz Esswein, From *Kiplinger's Personal Finance*, December 2013.

LOWDOWN

What You Need To Know About Tech Warranties

Extended coverage could pay off if your phone, laptop or tablet meets with an accident. BY PATRICIA MERTZ ESSWEIN

1. The dog ate my smart phone. In a recent survey of 1,000 parents, half said their kids had damaged a laptop, tablet or smart phone. Pets do their share of mischief, too. Plus, plenty of responsible adults drop a phone or laptop and crack the screen. So if you're buying a mobile device this holiday season, purchasing an extended warranty or service contract that covers what the industry calls accidental damage from handling (ADH) could be a smart move. It will cover repair or replacement of your device due to mishaps that manufacturers' warranties typically exclude.

2. Do your homework. Even if you intend to buy your tech gift at the mall, comparison-shop warranties on the Web, including the sites of retailers where you think you might buy the item and companies that sell warranties directly to consumers. Among the latter are Square Trade .com, ElectronicWarranty .com and Safeware.com, all of which are rated A or A+ by the Better Business Bureau. Find out the terms and conditions of extended coverage: deductibles, limitations (such as the number of damage incidents covered) and exemptions.

3. Take your time. An extended warranty, even with beefed-up protection, typically costs 10% to 20% of the product's retail price, according to the Service Contract Industry Council. You're likely to get a hard sell at checkout because extended warranties generate a lot of profit for retailers—as much as 50% of what you pay for them. You can generally buy an extended warranty within 30 or 90 days of the purchase date. So if you're not sure you want the coverage, just say no at the time of purchase.

4. It pays to shop. Best Buy will charge you $180 for two years of extended coverage with ADH on an iPad, more than one-third of the $499 purchase price. You'll pay no deductibles, and there's no limit on the number of incidents covered, but you're entitled to only one free replacement. Apple's own AppleCare+ for iPad costs $99; it covers two incidents of accidental damage, each with a $49 service fee (deductible). The best deal: SquareTrade's two-year coverage with no deductible. It also costs $99 but covers unlimited incidents, up to the amount you paid for your device.

5. Convenience counts. Most extended-service warranties require you to take your device to a local authorized service provider or ship it to a more distant service depot. SquareTrade allows you to choose your service provider. For example, you can get repairs at a local Apple "Genius Bar" or an independent repair shop. You can also send your device to SquareTrade's own service depot (the repair and shipping will be free). If you take your device to an Apple store or repair shop, you'll pay out of pocket and submit a receipt for reimbursement.

6. And to play it safe... First of all, file your sales invoice and any paperwork regarding product claims. Register the extended warranty so there will be no hassle when you need repairs. And get a case for your phone or tablet. For example, for an iPad you can buy the OtterBox Defender Series case with screen protector and stand for $60 on Amazon.com. ■

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BUSINESS MATH ISSUE

With technology changing so fast, taking out a tech warranty is a poor financial choice.

1. List the key points of the article and information to support your position.
2. Write a group defense of your position using math calculations to support your view.

Video Cases

There are six video cases applying business math concepts to real companies such as Six Flags, Subaru of Indiana, Noodles & Company, BuyCostumes .com, EDP Renewables, and DHL. These videos can be found in Connect. Some background case information and assignment problems incorporating information on the companies are included at the end of Chapters 3, 8, 11, 12, 13, and 20.

VIDEO CASE — PROJECT MANAGEMENT AT SIX FLAGS, NEW JERSEY

www.mhhe.com/slater2019_vc

In a constantly changing business environment, new product and service development can invigorate a company, improve market share, and ensure desired financial performance. Six Flags, with its "Go Big! Go Six Flags" motto, knows it must regularly add new rides and upgrade existing ones in its theme parks to remain on top.

Located in Grand Prairie, Texas, Six Flags first opened in 1961 and grew to become the largest regional theme park system in the world. Central to this growth was the constant development of new and record-setting theme park rides, following a well-defined process of product development. Consider the Kingda Ka roller coaster that opened in May 2005 at the Six Flags Great Adventure & Wild Safari in Jackson, New Jersey. This is the largest of the Six Flags parks, and Kingda Ka is the tallest and fastest coaster in North America.

Getting to the May 2005 ride opening required significant planning and a coordinated effort. Six Flags' new product development process ensures both. It guides and choreographs the hundreds of tasks involved in building a roller coaster, from preparing the foundation to erecting the steel frame to installing the hydraulic system that allows for speeds of 128 mph to fitting out the cars.

Six Flags relies on several key documents to control and monitor all resources, including raw materials, equipment, and the people involved in the construction of the ride. The Statement of Work (SOW) is a written statement that describes the work to be done and includes a preliminary project schedule and completion dates. The SOW details project milestones, key completion events, and budget parameters. The Work Breakdown Structure (WBS) defines the hierarchy of tasks, subtasks, and work packages and is key to managing the logistics of the project. The project Gantt chart illustrates the project schedule and helps identify the critical path within the project. The critical path represents the longest chain of tasks in terms of time to complete. If there is a delay in any step in the critical path, the whole project can be delayed.

The Kingda Ka ride had a 15-month project schedule of which 9 to 10 months were actual construction time. The coaster took 16 months to complete and came in 10% over budget. Success in new product development requires careful planning, well-defined milestones, teamwork, and flexibility to respond to unforeseen changes. The successful Kingda Ka ride was no exception.

PROBLEM 1

As stated in the case, the original project schedule for the Kingda Ka coaster was 15 months but the project actually took 16 months to complete. What was the percent increase over the original scheduled completion time? Round your answer to the nearest percent.

PROBLEM 2

Review the video case to identify the timing of key steps in the construction of the Kingda Ka, including start of conceptual planning, start of foundation construction, start of steel erection, and completion of the project. What percent of the actual total project time had elapsed by the time foundation construction began? By the time steel erection began? Round answers to the nearest percent.

PROBLEM 3

The project Gantt chart shown in the video indicated that 145 days were planned for site preparation, 119 days for foundations, and 133 for steel erection. What was the percentage of time needed for each of these three steps assuming 397 days were needed in total? Round answers to the nearest percent.

PROBLEM 4

The Kindga Ka is currently the tallest steel roller coaster, at 456 feet high. The second tallest is the Top Thrill Dragster at Cedar Point in Sandusky, Ohio, at 420 feet. How much taller is the Kingda Ka in both feet and percentage (*to the nearest tenth percent*)?

PROBLEM 5

If Six Flags wanted to build a roller coaster that was 5% taller than the Kingda Ka, how tall would the coaster need to be? Round answer to the nearest foot.

PROBLEM 6

Six Flags rates its rides as mild, moderate, or max. The Six Flags Great Adventure park where the Kingda Ka ride is located has a total of 49 rides. Of these, 12 have a max rating, 8 have a moderate rating, and the remainder are rated mild. Express each of the ride types as a fraction and then determine the percentage each comprises of the total. Reduce fractions to the lowest possible terms and round percentages to the nearest percent.

PROBLEM 7

The Kingda Ka ride covers 3,118 feet of track. The Green Lantern, a new ride at the same park, has ¾ mile of track. Which ride is longer and by what percent? Round answer to the nearest percent.

PROBLEM 8

As the case states, the Kingda Ka ride reaches speeds of 128 mph due to its hydraulic system. The Green Lantern ride is designed to reach speeds of 63 mph. What percent increase would be needed for the Green Lantern ride to match the speed attained on the Kingda Ka? Round answer to the nearest tenth percent.

Class Discussion In any project, project managers must balance three key variables—time, cost, and quality. Typically one variable is most critical in a project and should problems arise, the other two may be sacrificed to achieve the one that is key to the project's success. Discuss how these three variables were managed in the Kingda Ka project.

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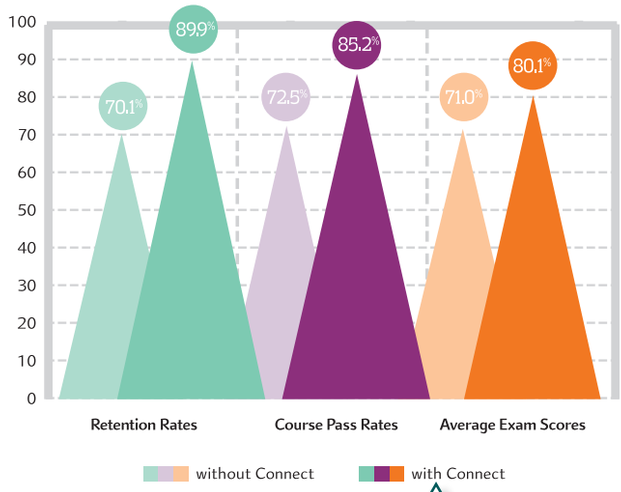

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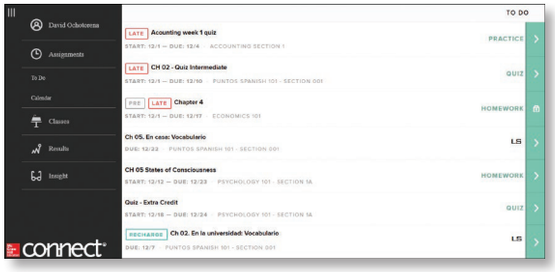

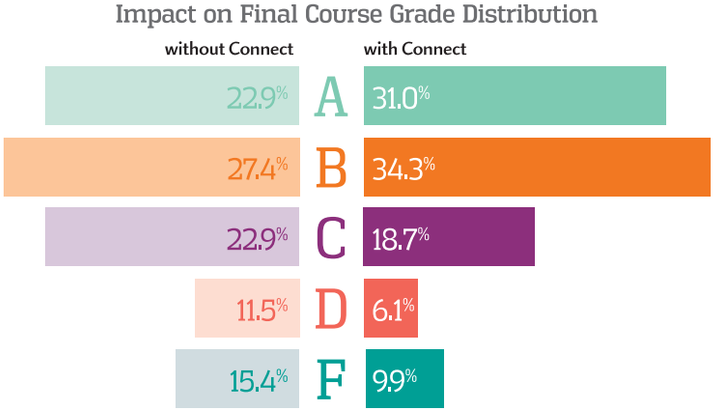

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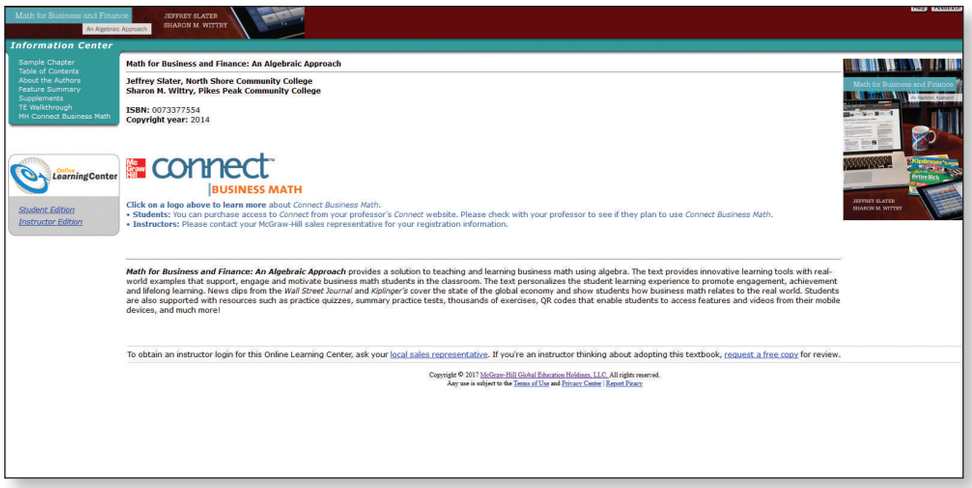
- If you're looking for some guidance on how to use Connect, or want to learn tips and tricks from super users, you can find tutorials as you work. Our Digital Faculty Consultants and Student Ambassadors offer insight into how to achieve the results you want with Connect.

Supplements Package

Instructor and Student Resources in Connect

The Business Math Instructor Resource Library in Connect contains text updates, the Instructors Resource Guide, test bank, and PowerPoint slides.

Students can access all of the necessary course materials, including Excel templates, calculator guides, the Fractions Extra Practice Worksheet, and more through Connect or the Student Resource page, mhhe.com/slater2e.



Business Math Internet Resource Guide (available in Connect)

The Business Math Internet Resource Guide will take students online and show them and you interesting source materials for business math. Following an introduction on how to use the Internet, each chapter of the book has projects listed relating to the Internet. Additionally, for each chapter, there are suggestions for two mobile apps that relate to the chapter material.

Instructor's Resource Guide (available in Connect)

This resource manual includes:

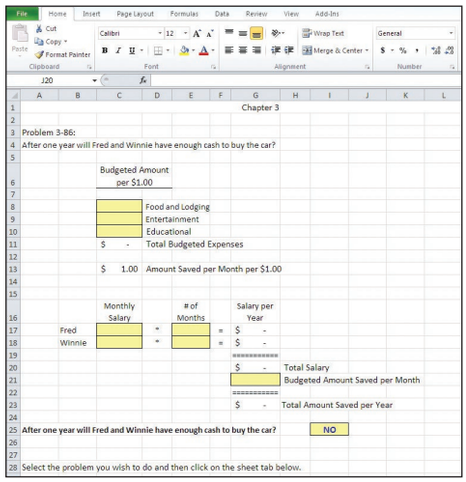
- Syllabus Preparation; Self-Paced Syllabus; Student Progress Chart
- Integrating the Electronic Calculator; Suggestions for Using Computers and Videos
- Suggestions for Regrouping Chapters
- Suggestions on Teaching Using the Business Math Internet Resource Guide
- Tips on Teaching Group Activities with *Kiplinger's Personal Finance* magazine
- Your Course versus Math Anxiety
- Sample Civil Service Exam with worked-out solutions
- Insight into Proportions supplement
- Excel Template Fact Sheet
- Check Figures for even-numbered end-of-chapter drill and word problems
- Appendix B Solutions (Chapters 1–21)

Each chapter includes:

- Teaching Tips from Jeff Slater and Sharon Wittry
- Lecture Outline
- The Pocket Calculator Workshop
- Suggested Solutions to Critical Thinking Discussion Questions
- Teacher's Guide to Kiplinger Group Activity
- Additional Word Problems (not in the text)
- Worked-Out Solutions to Practice Quizzes found in the *Student Solutions Manual and Study Guide*
- *Vocabulary Crossword Puzzle*s with solutions

Excel Workbook
(available in Connect)

The Excel Workbook is available in Connect. This workbook instructs your students in constructing their own spreadsheets. It includes business topics such as inventory, interest, markup, and annuities using problems from the text. The templates are on the Student Resource page and are available for selected end-of-chapter problems designated with an Excel logo. Students can run these templates as-is or add their own data.



Financial Calculator Guide
(available online)

This guide covers using the HP 10BII and TI BAII PLUS financial calculators for Chapters 10–12 and 16–20 in *Math for Business and Finance.* Many of the examples and practical quiz problems are illustrated. Selected end-of-chapter problems are also illustrated. This guide is divided into two sections. One section is devoted to the HP 10BII calculator and the other section covers the TI BAII PLUS calculator, also providing brief introductions to using each model.

Electronic Calculator Guide with Computer Applications
(available online)

This manual coordinates *Math for Business and Finance* applications with instruction in the 10-key calculator and computer keypad. It also reviews the touch method, includes speed drills, and helps students apply new skills to business math word problems. An introduction to Excel spreadsheets and how to enter data in spreadsheets is included.

TI-83/TI-84 Graphing Calculator Guide
(available online)

For every chapter covered there are keystrokes with notes on how to use the graphing calculator, Practice Sets and Problems, as well as coverage on how to solve the Summary Practice Tests.

ALEKS for Business Math

ALEKS (Assessment and Learning in Knowledge Spaces) is an artificial intelligence–based system, which, acting much like a human tutor, can provide individualized assessment, practice, and learning. By assessing the student's knowledge, ALEKS focuses clearly on what the student is ready to learn next and helps students master the course content more quickly and clearly. Visit ALEKS at www.aleks.com.

Assurance of Learning Ready

Many educational institutions today are focused on the notion of *assurance of learning,* an important element of some accreditation standards. *Math for Business and Finance* is designed specifically to support your assurance of learning initiatives with a simple, yet powerful solution.

Each test bank question for *Math for Business and Finance* maps to a specific chapter learning objective listed in the text. You can use our test bank software, EZ Test and EZ Test Online, or *Connect Business Math* to easily query for learning objectives that directly relate to the learning objectives for your course. You can then use the reporting features of EZ Test to aggregate student results in similar fashion, making the collection and presentation of assurance of learning data simple and easy.

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Alternate Choices

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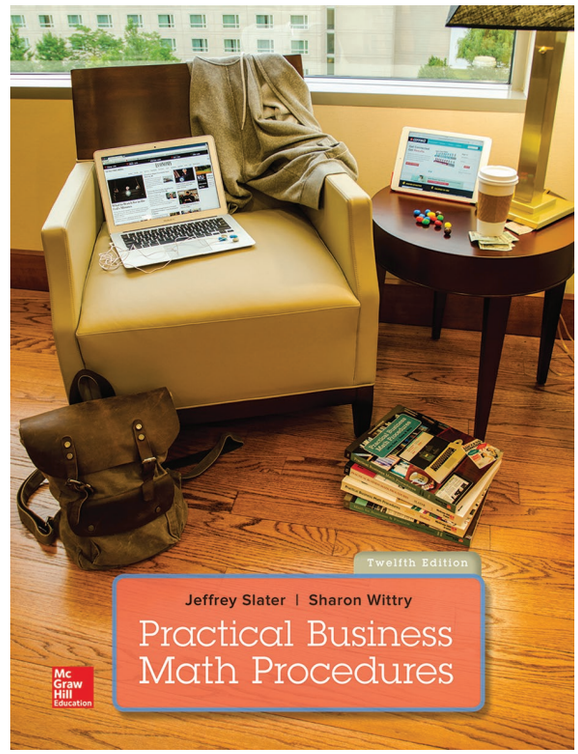

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Company/*Applications*

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Math for Business and Finance

An Algebraic Approach

CHAPTER 1

Problem Solving with Math

'Gangnam' Re-Styles YouTube

By Mike Ayers

Since his breakout hit "Gangnam Style" made its debut in July 2012, it has become the most watched video on YouTube to date, scoring more than 2.1 billion views. While this feat is staggering in itself, **Google** posted a nugget on its YouTube Google+ page Monday about this accomplishment, saying that the video had been viewed so many times Google needed to "upgrade" the video site's back end.

When YouTube was designed, it was never expected for a video to exceed 2,147,483,647 views because of how the counter software was originally coded. "It's like a car odometer," says YouTube spokesperson Matt McLernon. "Once it rolls over the last nine, it resets." He said the company expected two billion would be enough. It wasn't.

Exactly how did Google know they were in need of an upgrade?

A few months ago, site technicians noticed the view count for "Gangnam Style" would eventually hit that number and require a behind-the-scenes tweak. If they didn't do anything, in this case, the number would have remained static in the video's counter, but YouTube would continue to keep an accurate count of views in a separate location. Google updated the entire site's counter software, making it so a video can now register more than 9 quintillion views—or 9,223,372,036,854,775,808.

YouTube and Google marked the occasion with a special counter on the "Gangnam Style" page. A cursor hovering over the counter spins through the view count in the way a mileage counter on a car would.

Along with being a catchy song—it was still in the top five of YouTube songs streamed this past summer—Psy's YouTube channel has bumped his other tracks into stratospheric numbers as well. Earlier this year, he released a collaboration with Snoop Dogg called "Hangover," which has been viewed more than 162 million times since June 8.

"This is what happens when the whole world can play something at the same time," Mr. McLernon said. "And when one video brings you to a channel, you often go and watch other videos."

LEARNING UNIT OBJECTIVES

LU 1–1: Reading, Writing, and Rounding Numbers

1. Read and write numeric and verbal numbers using place values.
2. Round numbers to the indicated position.
3. Dissect and solve a word problem using the blueprint aid.

LU 1–2: Performing Basic Math Functions with Whole Numbers

1. Add whole numbers.
2. Subtract whole numbers.
3. Multiply whole numbers.
4. Divide whole numbers.

LU 1–3: Performing Basic Math Functions with Decimals

1. Add, subtract, multiply, and divide decimals.
2. Complete decimal applications in foreign currency.
3. Multiply and divide decimals by shortcut methods.

VOCABULARY PREVIEW

Here are key terms in this chapter. After completing the chapter, if you know the term, place a checkmark in the parentheses. If you don't know the term, look it up and put the page number where it can be found.

Addends ( ) Decimal ( ) Decimal point ( ) Decimal system ( ) Difference ( ) Dividend ( ) Divisor ( ) Minuend ( ) Multiplicand ( ) Multiplier ( ) Partial products ( ) Partial quotient ( ) Product ( ) Quotient ( ) Remainder ( ) Rounding all the way ( ) Subtrahend ( ) Sum ( ) Whole number ( )

GLOBAL

The *Wall Street Journal* clip "For Facebook Video Ads, $1 Million Is Just the Start" shows a video ad on Facebook that costs about $1 million *per day*.

People of all ages make personal business decisions based on the answers to number questions. Numbers also determine most of the business decisions of companies. For example, go to the website of a company such as Nike and note the importance of numbers in the company's business decision-making process.

The following *Wall Street Journal* clipping "Top 10 Countries" shows that nearly 1 million workers work for Nike in 477 factories worldwide.

For Facebook Video Ads, $1 Million Is Just the Start

By Reed Albergotti

A video ad on **Facebook** will cost advertisers about $1 million a day, but the social network won't accept a check from just anyone.

Source: *The Wall Street Journal*, 2014.

Top 10 Countries
by Number of Workers

		Factories	Workers
1.	Vietnam	65	312,667
2.	China	195	249,665
3.	Indonesia	40	168,167
4.	Sri Lanka	23	32,224
5.	Thailand	35	31,163
6.	India	25	28,195
7.	Brazil	55	22,592
8.	Bangladesh	4	21,567
9.	Mexico	25	18,525
10.	Honduras	10	17,252

Source: *The Wall Street Journal*, 2014.

Nike has to use numbers to see:

1. If sales goals are met.
2. If inventory outages are minimized.
3. How much should be spent on new-product development.
4. How to improve production facilities to achieve lower unit costs and better quality control.

You use math daily: calculating when to set your alarm, determining if you have enough gas, choosing which brand to buy, and so on. The tools in this course will help expand your math knowledge.

From the time we learned how to show two fingers to demonstrate our age, we have been applying math-related skills. To this day, we routinely use math in both our professional and personal lives without even being aware of it. For example, we apply math knowledge to determine if we have enough gas to get where we are going or to compare prices on similar products.

Our professional and personal financial health depend upon being able to apply our mathematical knowledge to make informed purchasing decisions, savings and investing decisions, debt reduction decisions, and many others, so it is critical that we understand the basics of math and know how to apply them.

Throughout this text you will apply practical applications of math that will provide you with the opportunity to hone your problem-solving skills to enhance both your personal and professional financial health.

Our study of business and financial math begins with a review of basic math skills that focuses on speed and accuracy. You may think, "But I can use my calculator." Even if your instructor allows you to use a calculator, you still must know the basic computation skills. You need these skills to know what to calculate, how to interpret your calculations, how to make estimates to recognize errors you made in using your calculator, and how to make calculations when you do not have a calculator.

Learning Unit 1–1: Reading, Writing, and Rounding Numbers

Wow! Did you know that back in 2012 over 144 billion e-mails were sent daily worldwide? In this unit, we will see how to read, write, and round whole numbers.

Now let's begin our study of numbers.

Reading and Writing Numeric and Verbal Numbers

The United States' numbering system is the **decimal system.** Your calculator gives the 10 single-digit numbers of the decimal system—0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The center of the decimal system is the **decimal point.** When you have a number with a decimal point, the numbers to the left of the decimal point are **whole numbers** and the numbers to the right of the decimal point are decimal numbers.

Source: *The Wall Street Journal.*

The decimal system is a *place-value system* based on the powers of 10. Any whole number can be written with the 10 digits of the decimal system because the position, or placement, of the digits in a number gives the value of the digits.

LO 1

To determine the value of each digit in a number, we use a place-value chart (Figure 1.1) that divides numbers into named groups. To separate a number into groups, you begin with the digit to the left of the decimal point or the digit in the ones place and insert commas every three digits, moving from right to left. This divides the number into the named groups (units, thousands, millions, billions, trillions) shown in the place-value chart. Within each group, you have a ones, tens, and hundreds place. Keep in mind that the leftmost group may have fewer than three digits. The positions (place values) of the digits to the right of the decimal point are shown in Figure 1.1 as well. To read or write decimal numbers, you read or write the decimal number as if it were a whole number. Then you use the name of the decimal place of the last digit as given in Figure 1.1. For example, .0796 is seven hundred ninety-six ten thousandths.

GLOBAL

In Figure 1.1, the numeric number 1,605,743,891,412 illustrates place values. When you study the place-value chart, you can see that the value of each place in the chart is 10 times the

FIGURE 1.1

Place-value chart

Whole Number Groups																	Decimal Place Values					
Trillions				Billions				Millions				Thousands				Units								
Hundred trillions	Ten trillions	Trillions	Comma	Hundred billions	Ten billions	Billions	Comma	Hundred millions	Ten millions	Millions	Comma	Hundred thousands	Ten thousands	Thousands	Comma	Hundreds	Tens	Ones (units)	Decimal Point	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths
																				$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1,000}$	$\frac{1}{10,000}$	$\frac{1}{100,000}$
		1	,	6	0	5	,	7	4	3	,	8	9	1	,	4	1	2	.	2	8	6	4	5

Literal translations

Here is what some numbers are called in different languages. Several languages other than English more clearly identify the place value of the numbers.

Language	27	17
English	'twenty'-'seven'	'seventeen'
Chinese	'two'-'ten'-'seven'	'ten'-'seven'
Japanese	'two'-'ten'-'seven'	'ten'-'seven'
Turkish	'twenty'-'seven'	'ten'-'seven'

Source: *The Wall Street Journal*, 2014.

value of the place to the right. We can illustrate this by analyzing the last four digits in the number 1,605,743,891,412:

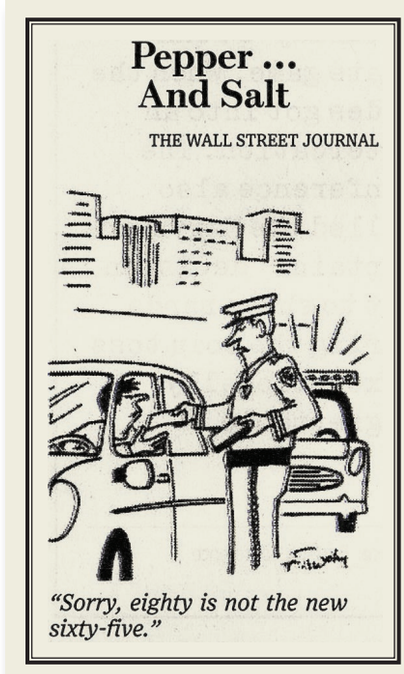
$$1{,}412 = (1 \times 1{,}000) + (4 \times 100) + (1 \times 10) + (2 \times 1)$$

So we can also say, for example, that in the number 745, the "7" means seven hundred (700); in the number 75, the "7" means 7 tens (70).

To read and write a numeric number in verbal form, you begin at the left and read each group of three digits as if it were alone, adding the group name at the end (except the last units group and groups of all zeros). Using the place-value chart in Figure 1.1, the number 1,605,743,891,412.28645 is read as one trillion, six hundred five billion, seven hundred forty-three million, eight hundred ninety-one thousand, four hundred twelve and twenty-eight thousand six hundred forty-five hundred thousandths. You do not read zeros. They fill vacant spaces as placeholders so that you can correctly state the number values. Also, the numbers twenty-one to ninety-nine must have a hyphen. Note in the *Wall Street Journal* clip "Literal translations" how place value is identified in different languages. And most important, remember *and* indicates the decimal.

Before we look at how to round numbers, we should look at how to convert a number indicating parts of a whole number to a whole number. We will use the following *Wall Street Journal* clip about Google as an example. Google has ad revenue of 50.5 billion dollars. This amount is 50 billion plus 500 million of an additional billion.

GLOBAL



Source: *The Wall Street Journal*, permission Cartoon Features Syndicate.

Google and Advertisers Follow You to the Mall

By Alistair Barr

Retailers have long struggled to determine whether online ads fuel sales in bricks-and-mortar stores. Now, **Google** Inc. is testing a way to solve that puzzle.

A pilot program begun by the Internet company is helping about six advertisers match the anonymous tracking cookies on users' computers to in-store sales information collected by data providers like **Acxiom** Corp. and **DataLogix Holdings** Inc., according to people familiar with the test.

Source: *The Wall Street Journal*, 2014.

The following steps explain how to convert decimal numbers into a regular whole number:

CONVERTING PARTS OF A MILLION, BILLION, TRILLION, ETC., TO A REGULAR WHOLE NUMBER

Step 1. Drop the decimal point and insert a comma.

Step 2. Add zeros so the leftmost digit ends in the word name of the amount you want to convert. Be sure to add commas as needed.

EXAMPLE Convert 2.1 million to a regular whole number.

Step 1. 2.1 million

2,1 Change the decimal point to a comma.

Step 2. 2,100,000 Add zeros and commas so the whole number indicates million.

One of the most common uses of decimals occurs when we spend dollars and cents, which is a *decimal number*. A **decimal** is a decimal number with digits to the right of a *decimal point,* indicating that decimals are parts of a whole that are less than one. Thus, we can interchange the terms *decimals* and *decimal numbers.* Remembering this will avoid confusion between the terms *decimal, decimal number,* and *decimal point.*

TABLE 1.1

Analyzing a bag of M&M'S®

©akulamatiau/123RF

Color*	Decimal
Yellow	.33
Red	.18
Blue	.16
Orange	.13
Brown	.11
Green	.09
Total	1.00

*The color ratios currently given are a sample used for educational purposes. They do not represent the manufacturer's color ratios.

LO 2

Rounding Numbers

Many of the numbers you read and hear are rounded numbers. Government statistics are usually rounded numbers. The financial reports of companies also use rounded numbers. All rounded numbers are *approximate* numbers. The more rounding you do, the more you approximate the number.

Rounded numbers are used for many reasons. With rounded numbers you can quickly estimate arithmetic results, check actual computations, report numbers that change quickly such as population numbers, and make numbers easier to read and remember.

Refer to the bag of M&M'S® shown in Table 1.1. In Table 1.1, the six colors in the 1.69-ounce bag of M&M'S® are expressed in decimals rounded to the nearest hundredths.

Numbers can be rounded to any identified digit place value, including the first digit of a number (rounding all the way). To round numbers, use the following four steps:

ROUNDING NUMBERS

Step 1. Identify the place value of the digit you want to round.

Step 2. If the digit to the right of the identified digit in Step 1 is 5 or more, increase the identified digit by 1 (round up). If the digit to the right is less than 5, do not change the identified digit.

Step 3. Change all digits to the right of the rounded identified digit to zeros.

Step 4. If the digit you want to round is to the right of the decimal point, drop all digits to the right of the identified digit after following Step 2 above.

EXAMPLE 1 Round 9,362 to the nearest hundred.

Step 1. 9,362 The digit 3 is in the hundreds place value.

Step 2. The digit to the right of 3 is 5 or more (6). Thus, 3, the identified digit in Step 1, is now rounded to 4. You change the identified digit only if the digit to the right is 5 or more.

9,462

Step 3. 9,400 Change digits 6 and 2 to zeros, since these digits are to the right of 4, the rounded number.

By rounding 9,362 to the nearest hundred, you can see that 9,362 is closer to 9,400 than to 9,300.

Next, we show you how to round to the nearest thousand.

EXAMPLE 2 Round 67,951 to the nearest thousand.

Step 1. 67,951 The digit 7 is in the thousands place value.

Step 2. The digit to the right of 7 is 5 or more (9). Thus, 7, the identified digit in Step 1, is now rounded to 8.

68,951

Step 3. 68,000 Change digits 9, 5, and 1 to zeros, since these digits are to the right of 8, the rounded number.

By rounding 67,951 to the nearest thousand, you can see that 67,951 is closer to 68,000 than to 67,000.

EXAMPLE 3 Round .3272727 to the nearest hundredth.

Step 1. .3272727 The identified digit is 2, which is in the hundredths place (two places to the right of the decimal point).

Step 2. The digit to the right of 2 is more than 5 (7). Thus, 2, the identified digit in Step 1, is changed to 3.

.3372727

Step 3. .33 Drop all other digits to the right of the identified digit 3.

We could also round .3272727 to the nearest tenth or thousandth as follows:

	Tenth	or	Thousandth
.3272727	.3	.3272727	.327

OTHER EXAMPLES

Round to nearest dollar:	$166.39	$166
Round to nearest cent:	$1,196.885	$1,196.89
Round to nearest hundredth:	$38.563	$38.56
Round to nearest thousandth:	$1,432.9981	$1,432.998

The rules for rounding can differ with the situation in which rounding is used. For example, have you ever bought one item from a supermarket produce department that was marked "3 for $1" and noticed what the cashier charged you? One item marked "3 for $1" would not cost you $33\frac{1}{3}$ cents rounded to 33 cents. You will pay 34 cents. Many retail stores round to the next cent even if the digit following the identified digit is less than $\frac{1}{2}$ of a penny. In this text we round on the concept of 5 or more.

Now let's look at **rounding all the way.** To round a number all the way, you round to the first digit of the number (the leftmost digit) and have only one nonzero digit remaining in the number.

EXAMPLE 4 Round 7,843 all the way.

Step 1. 7,843 Identified leftmost digit is 7.

Step 2. Digit to the right of 7 is greater than 5, so 7 becomes 8.

8,843

Step 3. 8,000 Change all other digits to zeros.

Rounding 7,843 all the way gives 8,000.

Remember that rounding a digit to a specific place value depends on the degree of accuracy you want in your estimate. For example, in the *Wall Street Journal* article "Wal-Mart Fights Back In China," 9.8 million rounded all the way would be 10 million. Note the digit to the right of the identified digit is 5 or greater so the identified digit (9) is rounded up to 10.

9,800,000 → 10,000,000

5 or greater

Identified digit

Before concluding this unit, let's look at how to dissect and solve a word problem.

How to Dissect and Solve a Word Problem

As a student, your author found solving word problems difficult. Not knowing where to begin after reading the word problem caused the difficulty. Today, students still struggle with word problems as they try to decide where to begin.

Solving word problems involves *organization* and *persistence*. Recall how persistent you were when you learned to ride a two-wheel bike. Do you remember the feeling of success you experienced when you rode the bike without help? Apply this persistence to word problems. Do not be discouraged. Each person learns at a different speed. Your goal must be to FINISH THE RACE and experience the success of solving word problems with ease.

To be organized in solving word problems, you need a plan of action that tells you where to begin—a blueprint aid. Like a builder, you will refer to this blueprint aid constantly until you know the procedure. The blueprint aid for dissecting and solving a word problem appears below. Note that the blueprint aid serves an important function—**it decreases your math anxiety.** *Remember to RTDQ2: Read the darn question and then read it again before trying to solve it.*

Blueprint Aid for Dissecting and Solving a Word Problem

LO 3

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT				

Now let's study this blueprint aid. The first two columns require that you *read* the word problem slowly. Think of the third column as the basic information you must know or calculate before solving the word problem. Often this column contains formulas that provide the foundation for the step-by-step problem solution. The last column reinforces the key points you should remember.

It's time now to try your skill at using the blueprint aid for dissecting and solving a word problem.

The Word Problem On the 100th anniversary of Tootsie Roll Industries, the company reported sharply increased sales and profits. Sales reached one hundred ninety-four million dollars and a record profit of twenty-two million, five hundred fifty-six thousand dollars. The company president requested that you round the sales and profit figures all the way.

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Study the following blueprint aid and note how we filled in the columns with the information in the word problem. You will find the organization of the blueprint aid most helpful. Be persistent! You *can* dissect and solve word problems! When you are finished with the word problem, make sure the answer seems reasonable.

BLUEPRINT	The facts	Solving for?	Steps to take	Key points
	Sales: One hundred ninety-four million dollars. *Profit:* Twenty-two million, five hundred fifty-six thousand dollars.	Sales and profit rounded all the way.	Express each verbal form in numeric form. Identify leftmost digit in each number.	Rounding all the way means only the leftmost digit will remain. All other digits become zeros.

Steps to solving problem

1. Convert verbal to numeric.
   One hundred ninety-four million dollars → $194,000,000
   Twenty-two million, five hundred fifty-six thousand dollars → $ 22,556,000
2. Identify leftmost digit of each number.
   $194,000,000 $22,556,000
3. Round.
   $200,000,000 $20,000,000

Note that in the final answer, $200,000,000 and $20,000,000 have only one nonzero digit.

Remember that you cannot round numbers expressed in verbal form. You must convert these numbers to numeric form.

Now you should see the importance of the information in the third column of the blueprint aid. When you complete your blueprint aids for word problems, do not be concerned if the order of the information in your boxes does not follow the order given in the text boxes. Often you can dissect a word problem in more than one way.

Your first Practice Quiz follows. Be sure to study the paragraph that introduces the Practice Quiz.

MONEY tips

Do not carry your Social Security card in your wallet. Keep it and other important documents in a safe deposit box or fireproof container. Shred any document that contains personal information, such as anything with your Social Security number on it, old bank statements, applications for loans, and so on.

LU 1–1 PRACTICE QUIZ

Complete this **Practice Quiz** to see how you are doing.

At the end of each learning unit, you can check your progress with a Practice Quiz. If you had difficulty understanding the unit, the Practice Quiz will help identify your area of weakness. Work the problems on scrap paper. Check your answers with the worked-out solutions that follow the quiz.

1. Write in verbal form:
   a. 7,948.06 **b.** 48,775 **c.** 814,410,335,414
2. Round the following numbers as indicated:

	Nearest ten	Nearest hundred	Nearest thousand	Rounded all the way
	a. 92	**b.** 745	**c.** 8,341	**d.** 4,752

3. Kellogg's reported its sales as five million, one hundred eighty-one thousand dollars. The company earned a profit of five hundred two thousand dollars. What would the sales and profit be if each number were rounded all the way? (*Hint:* You might want to draw the blueprint aid since we show it in the solution.)

✓ Solutions

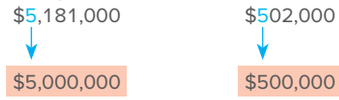
1. **a.** Seven thousand, nine hundred forty-eight and six hundredths
   b. Forty-eight thousand, seven hundred seventy-five
   c. Eight hundred fourteen billion, four hundred ten million, three hundred thirty-five thousand, four hundred fourteen
2. **a.** 90 **b.** 700 **c.** 8,000 **d.** 5,000

3. Kellogg's sales and profit:

BLUEPRINT	The facts	Solving for?	Steps to take	Key points
	Sales: Five million, one hundred eighty-one thousand dollars. *Profit:* Five hundred two thousand dollars.	Sales and profit rounded all the way.	Express each verbal form in numeric form. Identify leftmost digit in each number.	Rounding all the way means only the left-most digit will remain. All other digits become zeros.

Steps to solving problem

1. Convert verbal to numeric.
   Five million, one hundred eighty-one thousand → $5,181,000
   Five hundred two thousand → $ 502,000
2. Identify leftmost digit of each number.
3. Round.



LU 1–1a EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer). Worked-out solutions can be found in Appendix B at end of text.

1. Write in verbal form:
a. 8,682.52 **b.** 56,295 **c.** 732,310,444,888

2. Round the following numbers as indicated:

	Nearest ten	Nearest hundred	Nearest thousand	Rounded all the way
a.	43			
b.		654		
c.			7,328	
d.				5,980

3. Kellogg's reported its sales as three million, two hundred ninety-one thousand dollars. The company earned a profit of four hundred five thousand dollars. What would the sales and profit be if each number were rounded all the way?

Learning Unit 1–2: Performing Basic Math Functions with Whole Numbers

LO 1

We hear in the news that because of data breaches credit cards have sometimes been compromised. This means new credit cards need to be issued. Note in the following *Wall Street Journal* "Hack Attacks" the difference in the costly breaches between TJX and Heartland:

Heartland	$130,000,000
TJX	− 90,000,000
	$ 40,000,000

This unit teaches you how to manually add, subtract, multiply, and divide whole numbers. When you least expect it, you will catch yourself automatically using this skill.

Addition of Whole Numbers

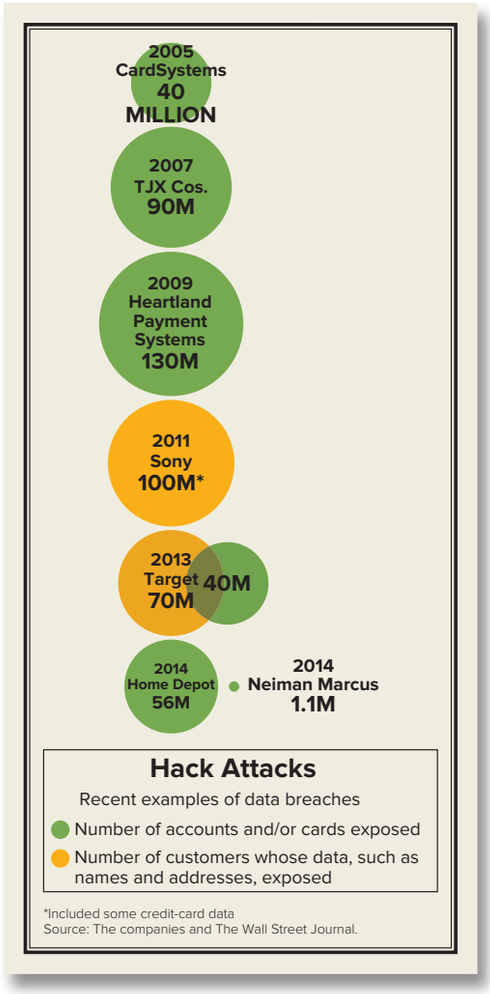
To add whole numbers, you unite two or more numbers called **addends** to make one number called a **sum,** *total,* or *amount.* The numbers are arranged in a column according to their place values—units above units, tens above tens, and so on. Then, you add the columns of numbers from top to bottom. To check the result, you re-add the columns from bottom to top. This procedure is illustrated in the steps that follow:

ADDING WHOLE NUMBERS

Step 1. Align the numbers to be added in columns according to their place values, beginning with the units place at the right and moving to the left.

Step 2. Add the units column. Write the sum below the column. If the sum is more than 9, write the units digit and carry the tens digit.

Step 3. Moving to the left, repeat Step 2 until all place values are added.



Source: *The Wall Street Journal*, 2014.

EXAMPLE

Adding top to bottom:

$$\begin{array}{r} {\scriptstyle 2\ 11} \\ 1{,}362 \\ 5{,}913 \\ 8{,}924 \\ +6{,}594 \\ \hline 22{,}793 \end{array}$$

Checking bottom to top

Alternate check Add each column as a separate total and then combine. The end result is the same.

$$\begin{array}{r} 1{,}362 \\ 5{,}913 \\ 8{,}924 \\ +6{,}594 \\ \hline 13 \\ 18 \\ 2\ 6 \\ 20 \\ \hline 22{,}793 \end{array}$$

How to Quickly Estimate Addition by Rounding All the Way In Learning Unit 1–1, you learned that rounding whole numbers all the way gives quick arithmetic estimates. Using the following *Wall Street Journal* clipping about defective airbags, note how you can round each number all the way and the total will not be rounded all the way. Remember that rounding all the way does not replace actual computations, but it is helpful in making quick commonsense decisions.

Number of vehicles suspected to have defective Takata airbags

Company	Vehicles Affected
Honda	5,051,364
Toyota	877,000
Nissan	694,600
BMW	627,615
Chrysler	371,309
Mazda	64,872
Ford	58,669
Subaru	17,516
Mitsubishi	11,985
GM	N.A.

Source: *The Wall Street Journal*, 2014.

Rounded all the way

$$\begin{array}{r} 5{,}000{,}000 \\ 900{,}000 \\ 700{,}000 \\ 600{,}000 \\ 400{,}000 \\ 60{,}000 \\ 60{,}000 \\ 20{,}000 \\ +\ \ 10{,}000 \\ \hline 7{,}750{,}000 \end{array}$$

Rounding all the way means each number has only one nonzero digit.

Note: The final answer could have more than one nonzero digit since the total is not rounded all the way.

LO 2

Subtraction of Whole Numbers

Subtraction is the opposite of addition. Addition unites numbers; subtraction takes one number away from another number. In subtraction, the top (largest) number is the **minuend.** The number you subtract from the minuend is the **subtrahend,** which gives you the **difference** between the minuend and the subtrahend. The steps for subtracting whole numbers follow:

SUBTRACTING WHOLE NUMBERS

Step 1. Align the minuend and subtrahend according to their place values.

Step 2. Begin the subtraction with the units digits. Write the difference below the column. If the units digit in the minuend is smaller than the units digit in the subtrahend, borrow 1 from the tens digit in the minuend. One tens digit is 10 units.

Step 3. Moving to the left, repeat Step 2 until all place values in the subtrahend are subtracted.

EXAMPLE The previous *Wall Street Journal* clipping about airbags illustrates the subtraction of whole numbers:

What is the difference in the number of vehicles affected between Subaru and Mitsubishi? As shown below you can use subtraction to arrive at the 5,531 difference.

$$\begin{array}{rl} 17{,}516 & \leftarrow \text{Minuend (larger number)} \\ -11{,}985 & \leftarrow \text{Subtrahend} \\ \hline 5{,}531 & \leftarrow \text{Difference} \end{array}$$

Check

$$\begin{array}{r} 5{,}531 \\ +11{,}985 \\ \hline 17{,}516 \end{array}$$

MONEY tips

College *is* worth it! College graduates earn substantially more money each year than high school graduates *and* that wage premium is increasing steadily—almost twice as much. Stay in school.

In subtraction, borrowing from the column at the left is often necessary. Remember that 1 ten = 10 units, 1 hundred = 10 tens, and 1 thousand = 10 hundreds.

In the tens column in the example above, 8 cannot be subtracted from 1 so we borrow from the hundreds column, resulting in 11 less 8 equals 3. In the hundreds column, we cannot subtract 9 from 4 so we borrow 10 hundreds from the thousands column leaving 14 hundreds. 14 less 9 equals 5.

Checking subtraction requires adding the difference (5,531) to the subtrahend (11,985) to arrive at the minuend (17,516).

Multiplication of Whole Numbers—Shortcut to Addition

The *Wall Street Journal* clip in the margin reveals that $16 billion fraud loss occurred in 2013. If the $16 billion figure were for four quarters, the fraud would be $4 billion per quarter. If you divide $16 billion by four quarters, you would get $4,000,000,000.

From calculating the cost of fraud for four quarters you know that multiplication is a *shortcut to addition*:

Fraud losses on bank and credit card accounts in 2013: **$16 billion**

Source: *The Wall Street Journal*, 2014.

$$\$4{,}000{,}000{,}000 \times 4 = \$16{,}000{,}000{,}000$$

or

$$\$4{,}000{,}000{,}000 + \$4{,}000{,}000{,}000 + \$4{,}000{,}000{,}000 + \$4{,}000{,}000{,}000 = \$16{,}000{,}000{,}000$$

Before learning the steps used to multiply whole numbers with two or more digits, you must learn some multiplication terminology.

Note in the following example that the top number (number we want to multiply) is the **multiplicand.** The bottom number (number doing the multiplying) is the **multiplier.** The final number (answer) is the **product.** The numbers between the multiplier and the product are **partial products.** Also note how we positioned the partial product 2090. This number is the result of multiplying 418 by 50 (the 5 is in the tens position). On each line in the partial products, we placed the first digit directly below the digit we used in the multiplication process.

EXAMPLE

$$\begin{array}{rl} 418 & \leftarrow \text{Top number (multiplicand)} \\ \times\ 52 & \leftarrow \text{Bottom number (multiplier)} \\ \hline \text{Partial products} \rightarrow \begin{array}{r} 836 \\ 20\,90 \end{array} & \begin{array}{r} 2 \times 418 = \quad 836 \\ 50 \times 418 = +\ 20{,}900 \end{array} \\ \hline 21{,}736 & \leftarrow \text{Product answer} \rightarrow 21{,}736 \end{array}$$

We can now give the following steps for multiplying whole numbers with two or more digits:

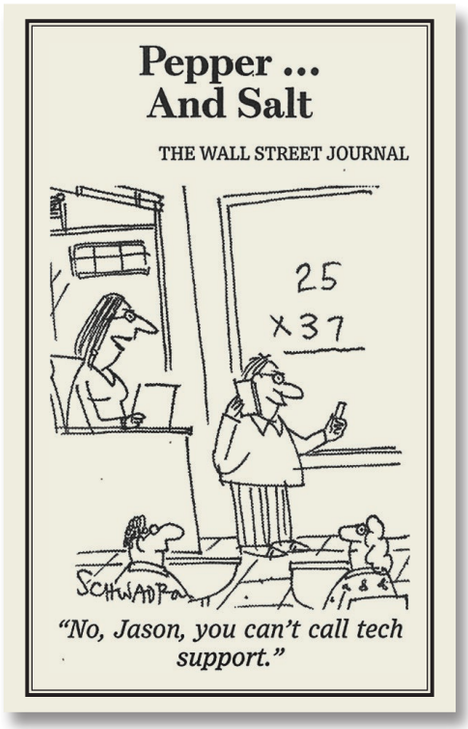
MULTIPLYING WHOLE NUMBERS WITH TWO OR MORE DIGITS

Step 1. Align the multiplicand (top number) and multiplier (bottom number) at the right. Usually, you should make the smaller number the multiplier.

Step 2. Begin by multiplying the right digit of the multiplier with the right digit of the multiplicand. Keep multiplying as you move left through the multiplicand. Your first partial product aligns at the right with the multiplicand and multiplier.

Step 3. Move left through the multiplier and continue multiplying the multiplicand. Your partial product right digit or first digit is placed directly below the digit in the multiplier that you used to multiply.

Step 4. Continue Steps 2 and 3 until you have completed your multiplication process. Then add the partial products to get the final product.



Source: *The Wall Street Journal*, permission Cartoon Features Syndicate.

Checking and Estimating Multiplication We can check the multiplication process by reversing the multiplicand and multiplier and then multiplying. Let's first estimate 52×418 by rounding all the way:

EXAMPLE

$$\begin{array}{rr} 50 \leftarrow & 52 \\ \times\ 400 \leftarrow & \times\ 418 \\ \hline 20{,}000 & 416 \\ & 52 \\ & 20\,8 \\ \hline & 21{,}736 \end{array}$$

By estimating before actually working the problem, we know our answer should be about 20,000. When we multiply 52 by 418, we get the same answer as when we multiply 418×52—and the answer is about 20,000. Remember, if we had not rounded all the way, our estimate would have been closer. If we had used a calculator, the rounded estimate would have helped us check the calculator's answer. Our commonsense estimate tells us our answer is near 20,000—not 200,000.

Before you study the division of whole numbers, you should know (1) the multiplication shortcut with numbers ending in zeros and (2) how to multiply a whole number by a power of 10.

MULTIPLICATION SHORTCUT WITH NUMBERS ENDING IN ZEROS

Step 1. When zeros are at the end of the multiplicand or the multiplier, or both, disregard the zeros and multiply.

Step 2. Count the number of zeros in the multiplicand and multiplier.

Step 3. Attach the number of zeros counted in Step 2 to your answer.

EXAMPLE

$$\begin{array}{r} 65{,}000 \\ \times\ 420 \\ \hline \end{array}$$

$$\begin{array}{r} 65 \\ \times\ 42 \\ \hline 1\ 30 \\ 26\ 0 \\ \hline 27{,}300{,}000 \end{array}$$

3 zeros
+ 1 zero
4 zeros

No need to multiply rows of zeros

$$\begin{array}{r} 65{,}000 \\ \times\ 420 \\ \hline 00\ 000 \\ 1\ 300\ 00 \\ 26\ 000\ 0 \\ \hline 27{,}300{,}000 \end{array}$$

MULTIPLYING A WHOLE NUMBER BY A POWER OF 10

Step 1. Count the number of zeros in the power of 10 (a whole number that begins with 1 and ends in one or more zeros such as 10, 100, 1,000, and so on).

Step 2. Attach that number of zeros to the right side of the other whole number to obtain the answer. Insert comma(s) as needed every three digits, moving from right to left.

EXAMPLE

$99 \times 10 = 990 = 990$ ← Add 1 zero

$99 \times 100 = 9{,}900 = 9{,}900$ ← Add 2 zeros

$99 \times 1{,}000 = 99{,}000 = 99{,}000$ ← Add 3 zeros

When a zero is in the center of the multiplier, you can do the following:

EXAMPLE

$$\begin{array}{r} 658 \\ \times\ 403 \\ \hline 1\,974 \\ 263\,2\square \\ \hline 265{,}174 \end{array} \qquad \begin{array}{rl} 3 \times 658 = & 1{,}974 \\ 400 \times 658 = & +\ 263{,}200 \\ & \hline & 265{,}174 \end{array}$$

Division of Whole Numbers

LO 4

Division is the reverse of multiplication and a time-saving shortcut related to subtraction. For example, in the introduction to this learning unit, you determined that fraud for four quarters resulted in \$4,000,000,000 loss per quarter. You multiplied \$4,000,000,000 × 4 to get \$16,000,000,000. Since division is the reverse of multiplication you can also say that \$16,000,000,000 ÷ 4 = \$4,000,000,000. Division can be indicated by the common symbols ÷ and $\overline{)}$, or by the bar — in a fraction and the forward slant / between two numbers, which means the first number is divided by the second number. Division asks how many times one number **(divisor)** is contained in another number **(dividend).** The answer, or result, is the **quotient.** When the divisor (number used to divide) doesn't divide evenly into the dividend (number we are dividing), the result is a **partial quotient,** with the left-over amount the **remainder** (expressed as fractions in later chapters). The following example illustrates *even division* (this is also an example of *long division* because the divisor has more than one digit).

EXAMPLE

$$\begin{array}{r} 18 \\ 15\overline{)270} \\ 15 \\ \hline 120 \\ 120 \\ \hline \end{array}$$

Divisor → 15) 270 ← Dividend; 18 ← Quotient

This example divides 15 into 27 once with 12 remaining. The 0 in the dividend is brought down to 12. Dividing 120 by 15 equals 8 with no remainder; that is, even division. The following example illustrates *uneven division with a remainder* (this is also an example of *short division* because the divisor has only one digit).

EXAMPLE

$$\begin{array}{r} 24\ \text{R1} \\ 7\overline{)169} \\ 14 \\ \hline 29 \\ 28 \\ \hline 1 \end{array}$$

24 R1 ← Remainder

Check

(7 × 24) + 1 = 169

Divisor × Quotient + Remainder = Dividend

Note how doing the check gives you assurance that your calculation is correct. When the divisor has one digit (short division) as in this example, you can often calculate the division mentally as illustrated in the following examples:

EXAMPLES

$$\begin{array}{r} 108 \\ 8\overline{)864} \end{array} \qquad \begin{array}{r} 16\ \text{R6} \\ 7\overline{)118} \end{array}$$

Next, let's look at the value of estimating division.

Estimating Division Before actually working a division problem, estimate the quotient by rounding. This estimate helps you check the answer. The example that follows is rounded all the way. After you make an estimate, work the problem and check your answer by multiplication.

EXAMPLE

$$\begin{array}{r} 36\ \text{R111} \\ 138\overline{)5{,}079} \\ 4\,14 \\ \hline 939 \\ 828 \\ \hline 111 \end{array}$$

Estimate

$$\begin{array}{r} 50 \\ 100\overline{)5{,}000} \end{array}$$

Check

$$\begin{array}{r} 138 \\ \times\ 36 \\ \hline 828 \\ 4\,14 \\ \hline 4{,}968 \\ +\ 111 \\ \hline 5{,}079 \end{array}$$

111 ← Add remainder

Now let's turn our attention to division shortcuts with zeros.

Division Shortcuts with Zeros The steps that follow show a shortcut that you can use when you divide numbers with zeros.

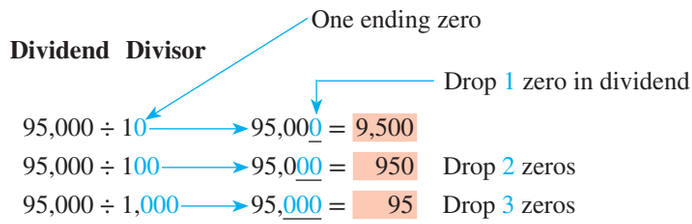
DIVISION SHORTCUT WITH NUMBERS ENDING IN ZEROS

Step 1. When the dividend and divisor have ending zeros, count the number of ending zeros in the divisor.

Step 2. Drop the same number of zeros in the dividend as in the divisor, counting from right to left.

Note the following examples of division shortcuts with numbers ending in zeros. Since two of the symbols used for division are ÷ and)‾, our first examples show the zero shortcut method with the ÷ symbol.

EXAMPLES



In a long division problem with the)‾ symbol, you again count the number of ending zeros in the divisor. Then drop the same number of ending zeros in the dividend and divide as usual.

EXAMPLE 6,500)‾88,000 ← Drop 2 zeros

65)‾880

$$\begin{array}{r} 13\ \text{R}35 \\ 65\overline{)880} \\ 65 \\ \hline 230 \\ 195 \\ \hline 35 \end{array}$$

You are now ready to practice what you learned.

LU 1–2 PRACTICE QUIZ

Complete this **Practice Quiz** to see how you are doing.

1. Add by totaling each separate column:

$$\begin{array}{r} 8{,}974 \\ 6{,}439 \\ +\ 6{,}941 \end{array}$$

2. Estimate by rounding all the way (do not round the total of estimate) and then do the actual computation:

$$\begin{array}{r} 4{,}241 \\ 8{,}794 \\ +\ 3{,}872 \end{array}$$

3. Subtract and check your answer:

$$\begin{array}{r} 9{,}876 \\ -\ 4{,}967 \end{array}$$

4. Jackson Manufacturing Company projected its year 2017 furniture sales at $900,000. During 2017, Jackson earned $510,000 in sales from major clients and $369,100 in sales from the remainder of its clients. What is the amount by which Jackson over- or under-estimated its sales?

5. Multiply by shortcut method:

$$\begin{array}{r} 77{,}000 \\ \times\ 1{,}800 \end{array}$$

6. Divide by shortcut method:

$4{,}000\overline{)96{,}000}$

7. Assume General Motors produces 960 Chevrolets each workday (Monday through Friday). If the cost to produce each car is $6,500, what is General Motors' total cost for the year? Check your answer.

✓ Solutions

1.
$$\begin{array}{r} 14 \\ 14 \\ 2\,2 \\ 20 \\ \hline 22{,}354 \end{array}$$

2.

Estimate	Actual
4,000	4,241
9,000	8,794
+ 4,000	+ 3,872
17,000	16,907

3.

	Check
8 18 6 16	
9,876	4,909
− 4,967	+ 4,967
4,909	9,876

4. Jackson Manufacturing Company over- or underestimated sales:

BLUEPRINT	The facts	Solving for?	Steps to take	Key points
	Projected 2017 sales: $900,000. *Major clients:* $510,000. *Other clients:* $369,100.	How much were sales over- or underestimated?	Total projected sales − Total actual sales = Over- or underestimated sales.	Projected sales (minuend) − Actual sales (subtrahend) = Difference.

Steps to solving problem

1. Calculate total actual sales.

$$\begin{array}{r} \$510{,}000 \\ +\ 369{,}100 \\ \hline \$879{,}100 \end{array}$$

2. Calculate overestimated or underestimated sales.

$$\begin{array}{r} \$900{,}000 \\ -\ 879{,}100 \\ \hline \$\ 20{,}900 \text{ (overestimated)} \end{array}$$

5. $77 \times 18 = 1{,}386 + 5$ zeros $= 138{,}600{,}000$

6. Drop 3 zeros $= 4\overline{)96}$ → 24

7. General Motors' total cost per year:

BLUEPRINT	The facts	Solving for?	Steps to take	Key points
	Cars produced each workday: 960. *Workweek:* 5 days. *Cost per car:* $6,500.	Total cost per year.	Cars produced per week × 52 = Total cars produced per year. Total cars produced per year × Total cost per car = Total cost per year.	Whenever possible, use multiplication and division shortcuts with zeros. Multiplication can be checked by division.

Steps to solving problem

1. Calculate total cars produced per week. — 5 × 960 = 4,800 cars produced per week
2. Calculate total cars produced per year. — 4,800 cars × 52 weeks = 249,600 total cars produced per year
3. Calculate total cost per year. — 249,600 cars × $6,500 = $1,622,400,000 (multiply 2,496 × 65 and add zeros)

Check

$1,622,400,000 ÷ 249,600 = $6,500 (drop 2 zeros before dividing)

LU 1–2a EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer). Worked-out solutions can be found in Appendix B at end of text.

1. Add by totaling each separate column:

$$\begin{array}{r} 9{,}853 \\ 7{,}394 \\ +8{,}843 \end{array}$$

2. Estimate by rounding all the way (do not round the total of estimate) and then do the actual computation:

$$\begin{array}{r} 3{,}482 \\ 6{,}981 \\ +5{,}490 \end{array}$$

3. Subtract and check your answer:
   9,787
   −5,968
4. Jackson Manufacturing Company projected its year 2017 furniture sales at $878,000. During 2017, Jackson earned $492,900 in sales from major clients and $342,000 in sales from the remainder of its clients. What is the amount by which Jackson over- or under-estimated its sales?
5. Multiply by shortcut method:
   86,000
   × 1,900
6. Divide by the shortcut method:
   3,000)99,000
7. Assume General Motors produces 850 Chevrolets each workday (Monday through Friday). If the cost to produce each car is $7,000, what is General Motors' total cost for the year?

Learning Unit 1–3: Performing Basic Math Functions with Decimals

LO 1

The *Wall Street Journal* clip "Order's Up" uses decimals while showing the difference in menu prices of a Johnny Rockets hamburger of $8.51 between Hoboken, NJ, and Lagos, Nigeria.

$14.00
− 5.49
$ 8.51

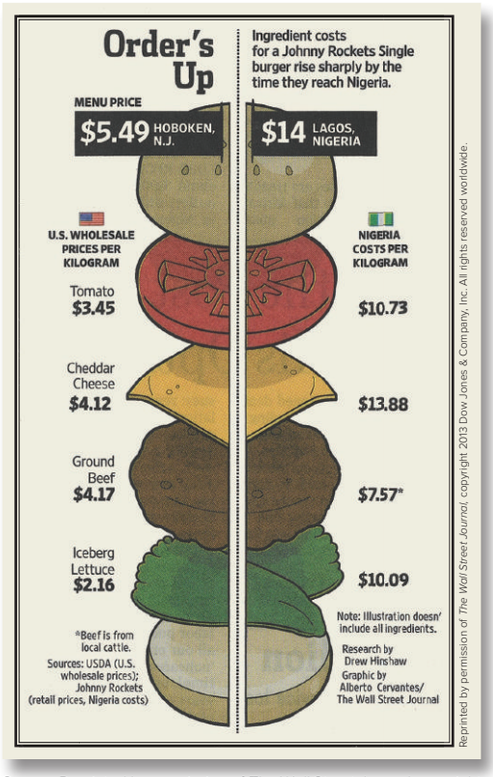
Pluggers have been cloud computing for years.

Source: ©2014 Tribune Content Agency, LLC; Brookins Art, LLC

Addition and Subtraction of Decimals

GLOBAL

Since you know how to add and subtract whole numbers, to add and subtract decimal numbers you have only to learn about the placement of the decimals. The following steps will help you:



Source: Reprinted by permission of *The Wall Street Journal*, copyright 2014 Dow Jones & Company, Inc. All rights reserved worldwide.

ADDING AND SUBTRACTING DECIMALS

Step 1. Vertically write the numbers so that the decimal points align. You can place additional zeros to the right of the decimal point if needed without changing the value of the number.

Step 2. Add or subtract the digits starting with the right column and moving to the left.

Step 3. Align the decimal point in the answer with the above decimal points.

EXAMPLES Add 4 + 7.3 + 36.139 + .0007 + 8.22.

Whole number to the right of the last digit is assumed to have a decimal.

```
 4.0000
 7.3000
36.1390
  .0007
 8.2200
55.6597
```

Extra zeros have been added to make calculation easier.

Subtract 45.3 − 15.273.

```
 2 9 10
45.300
−15.273
 30.027
```

Subtract 7 − 6.9.

```
 6 10
 7.0
−6.9
 .1
```

Multiplication of Decimals

The multiplication of decimal numbers is similar to the multiplication of whole numbers except for the additional step of placing the decimal in the answer (product). The steps that follow simplify this procedure:

MULTIPLYING DECIMALS

Step 1. Multiply the numbers as whole numbers, ignoring the decimal points.

Step 2. Count and total the number of decimal places in the multiplier and multiplicand.

Step 3. Starting at the right in the product, count to the left the number of decimal places totaled in Step 2. Place the decimal point so that the product has the same number of decimal places as totaled in Step 2. If the total number of places is greater than the places in the product, insert zeros in front of the product.

EXAMPLES

$$\begin{array}{rl} 8.52 & (2 \text{ decimal places}) \\ \times\ 6.7 & (1 \text{ decimal place}) \\ \hline 5\,964 & \\ 51\,12 & \\ \hline 57.084 & \end{array}$$

Step 1 → 6.7 (1 decimal place); Step 2 → 8.52 (2 decimal places); Step 3 → 57.084

$$\begin{array}{rl} 2.36 & (2 \text{ places}) \\ \times\ .016 & (3 \text{ places}) \\ \hline 1416 & \\ 236 & \\ \hline .03776 & \text{Need to add zero} \end{array}$$

Division of Decimals

If the divisor in your decimal division problem is a whole number, first place the decimal point in the quotient directly above the decimal point in the dividend. Then divide as usual. If the divisor has a decimal point, complete the steps that follow:

DIVIDING DECIMALS

Step 1. Make the divisor a whole number by moving the decimal point to the right.

Step 2. Move the decimal point in the dividend to the right the same number of places that you moved the decimal point in the divisor (Step 1). If there are not enough places, add zeros to the right of the dividend.

Step 3. Place the decimal point in the quotient above the new decimal point in the dividend. Divide as usual.

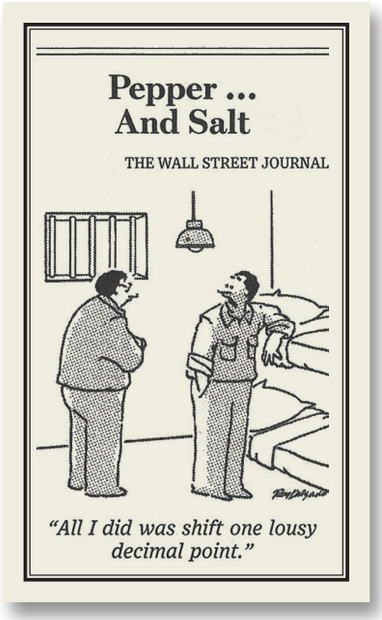
EXAMPLE

Step 3 → place the decimal point in the quotient above the new decimal point in the dividend.

$$\begin{array}{r} 1\,3.12 \\ \hline 2.5\overline{)\,32.8.00} \\ 25 \\ \hline 7\,8 \\ 7\,5 \\ \hline 3\,0 \\ 2\,5 \\ \hline 50 \\ 50 \\ \hline \end{array}$$

Step 1 → move the decimal point in the divisor to the right to make it a whole number (2.5 → 25).

Step 2 → move the decimal point in the dividend to the right the same number of places (32.8.00).



Source: *The Wall Street Journal*, permission Cartoon Features Syndicate.

Stop a moment and study the above example. Note that the quotient does not change when we multiply the divisor and the dividend by the same number. This is why we can move the decimal point in division problems and always divide by a whole number.

Decimal Applications in Foreign Currency

LO 2

EXAMPLE

Hanna Lind, who lives in Canada, wanted to buy a new Microsoft Surface 3. She went on eBay and found that the cost would be $600 in U.S. dollars. Wanting to know how much this would cost in Canadian dollars, Hanna consulted the following *Wall Street Journal*'s currency table and found that a Canadian dollar was worth $.8817 in U.S. dollars. Therefore, for each Canadian dollar it would cost $1.1341 to buy a U.S. good.

Using this information, Hanna completed the following calculation to determine what a Surface would cost her:

$600 (cost of the Surface in U.S. dollars)	×	$1.1341	=	$680.46 (cost of the Surface in Canadian dollars)

To check her findings, Hanna did the following calculation:

$680.46 (cost of the Surface in Canadian dollars)	×	$.8817 (what the Canadian dollar is worth against the U.S. dollar)	=	$599.96 (off due to rounding) (U.S. selling price)

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GLOBAL

Currencies & Commodities | WSJ.com/fx

Currencies

U.S.-dollar foreign-exchange rates in late New York trading

Country/currency	Mon — in US$	Mon — per US$	US$ vs, YTD chg (%)
Americas			
Argentina peso	.1172	8.5319	30.9
Brazil real	.3906	2.5602	8.4
Canada dollar	.8817	1.1341	6.8
Chile peso	.001632	612.60	16.5
Colombia peso	.0004414	2265.50	17.4
Ecuador US dollar	1	1	unch
Mexico peso	.0715	13.9876	7.3
Peru new sol	.3418	2.926	4.4
Uruguay peso	.04243	23.5680	11.2
Venezuela b. fuerte	.157480	6.3500	unch
Asia-Pacific			
Australian dollar	.8489	1.1780	5.0
1-mos forward	.8470	1.1807	4.8
3-mos forward	.8434	1.1856	4.8
6-mos forward	.8379	1.1934	4.9
China yuan	.1625	6.1532	1.6
Hong Kong dollar	.1289	7.7556	unch
India rupee	.01615	61.910	0.1
Indonesia rupiah	.0000813	12295	1.1
Japan yen	.008446	118.40	12.4
1-mos forward	.008451	118.32	11.0
3-mos forward	.008455	118.27	11.0
6-mos forward	.008464	118.15	11.0
Malaysia ringgit	.2919	3.4263	4.4
New Zealand dollar	.7866	1.2713	4.5
Pakistan rupee	.00982	101.855	-3.3
Philippines peso	.0223	44.841	1.0
Singapore dollar	.7653	1.3066	3.5
South Korea won	.0009010	1109.90	5.1
Taiwan dollar	.03212	31.135	4.0
Thailand baht	.03050	32.790	0.2
Vietnam dong	.00004674	21395	1.2

Country/currency	Mon — in US$	Mon — per US$	US$ vs, YTD chg (%)
Europe			
Czech Rep. koruna	.04519	22.126	11.3
Denmark krone	.1676	5.9673	9.9
Euro area euro	1.2470	.8019	10.2
Hungary forint	.004073	245.53	13.6
Norway krone	.1441	6.9396	14.3
Poland zloty	.2986	3.3490	10.8
Russia ruble	.01956	51.116	55.3
Sweden krona	.1344	7.4381	15.5
Switzerland franc	1.0367	.9646	8.0
1-mos forward	1.0371	.9642	7.4
3-mos forward	1.0377	.9636	7.4
6-mos forward	1.0391	.9624	7.4
Turkey lira	.4514	2.2152	3.1
UK pound	1.5729	.6358	5.3
1-mos forward	1.5727	.6359	5.0
3-mos forward	1.5720	.6361	5.0
6-mos forward	1.5707	.6367	5.0
Middle East/Africa			
Bahrain dinar	2.6517	.3771	unch
Egypt pound	.1399	7.1505	2.8
Israel shekel	.2549	3.9239	13.1
Jordan dinar	1.4187	.7049	-0.4
Kuwait dinar	3.4362	.2910	3.0
Lebanon pound	.0006612	1512.45	0.5
Saudi Arabia riyal	.2664	3.7536	0.1
South Africa rand	.0910	10.9912	4.8
UAE dirham	.2722	3.6732	unch

	Close	Net Chg	% Chg	YTD % Chg
WSJ Dollar Index	80.79	-0.10	-0.12	9.46

Sources: ICAP plc., WSJ Market Data Group

LO 3

Multiplication and Division Shortcuts for Decimals

The shortcut steps that follow show how to solve multiplication and division problems quickly involving multiples of 10 (10, 100, 1,000, 10,000, etc.).

MONEY tips

Formula for Financial Success: Reduce Spending + Decrease Debt + Increase Savings (Investing) = Healthy Net Worth

SHORTCUTS FOR MULTIPLES OF 10

Multiplication

Step 1. Count the zeros in the multiplier.

Step 2. Move the decimal point in the multiplicand the same number of places to the right as you have zeros in the multiplier.

Division

Step 1. Count the zeros in the divisor.

Step 2. Move the decimal point in the dividend the same number of places to the left as you have zeros in the divisor.

In multiplication, the answers are *larger* than the original number.

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EXAMPLE If Toyota spends $60,000 for magazine advertising, what is the total value if it spends this same amount for 10 years? What would be the total cost?

$60,000 × 10 = $600,000 (1 place to the right)

OTHER EXAMPLES

6.89 × 10 = 68.9 (1 place to the right)

6.89 × 100 = 689. (2 places to the right)

6.89 × 1,000 = 6,890. (3 places to the right)

In division, the answers are *smaller* than the original number.

EXAMPLES

6.89 ÷ 10 = .689 (1 place to the left)

6.89 ÷ 100 = .0689 (2 places to the left)

6.89 ÷ 1,000 = .00689 (3 places to the left)

6.89 ÷ 10,000 = .000689 (4 places to the left)

Now let's check your progress.

LU 1–3 PRACTICE QUIZ

Complete this **Practice Quiz** to see how you are doing.

1. Rearrange vertically and add: 14, .642, 9.34, 15.87321

2. Rearrange and subtract: 28.1549 − .885

3. Multiply and round the answer to the nearest tenth: 28.53 × 17.4

4. Divide and round to the nearest hundredth: 2,182 ÷ 2.83

Complete by the shortcut method:

5. 14.28 × 100 **6.** 9,680 ÷ 1,000 **7.** 9,812 ÷ 10,000

8. Could you help Mel decide which product is the "better buy"?

Dog food A: $9.01 for 64 ounces **Dog food B:** $7.95 for 50 ounces

Round to the nearest cent as needed.

9. At Avis Rent-A-Car, the cost per day to rent a medium-size car is $39.99 plus 29 cents per mile. What will it cost to rent this car for 2 days if you drive 602.3 miles? Since the solution shows a completed blueprint, you might use a blueprint also.

10. A trip to Mexico cost 6,000 pesos. What would this be in U.S. dollars? Check your answer.

✓ Solutions

1.
$$\begin{array}{r} 14.00000 \\ .64200 \\ 9.34000 \\ 15.87321 \\ \hline 39.85521 \end{array}$$

2.
$$\begin{array}{r} 7\ 101414 \\ 28.1549 \\ -\ .8850 \\ \hline 27.2699 \end{array}$$

3.
$$\begin{array}{r} 28.53 \\ \times\ 17.4 \\ \hline 11\ 412 \\ 199\ 71 \\ 285\ 3 \\ \hline 496.422 \end{array} = 496.4$$

4.
$$\begin{array}{r} 771.024 = 771.02 \\ 2.83\overline{)218200.000} \\ 1981 \\ \hline 2010 \\ 1981 \\ \hline 290 \\ 283 \\ \hline 7\ 00 \\ 5\ 66 \\ \hline 1\ 340 \\ 1\ 132 \end{array}$$

5. $14.28 = 1{,}428$

6. $9.680 = 9.680$

7. $.9812 = .9812$

8. **A:** $\$9.01 \div 64 = \$.14$ **B:** $\$7.95 \div 50 = \$.16$ Buy A.

9. Avis Rent-A-Car total rental charge:

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT	Cost per day, $39.99. 29 cents per mile. Drove 602.3 miles. 2-day rental.	Total rental charge.	Total cost for 2 days' rental + Total cost of driving = Total rental charge.	In multiplication, count the number of decimal places. Starting from right to left in the product, insert decimal in appropriate place. Round to nearest cent.

Steps to solving problem

1. Calculate total costs for 2 days' rental. $\$39.99 \times 2 = \$79.98$
2. Calculate the total cost of driving. $\$.29 \times 602.3 = \$174.667 = \$174.67$
3. Calculate the total rental charge.
$$\begin{array}{r} \$\ 79.98 \\ +\ 174.67 \\ \hline \$254.65 \end{array}$$

10. $6{,}000 \times \$.0715 = \$429$

Check $\$429 \times 13.9876 = 6{,}000.68$ pesos due to rounding

LU 1–3a EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer). Worked-out solutions can be found in Appendix B at end of text.

1. Rearrange vertically and add:
16, .831, 9.85, 17.8321

2. Rearrange and subtract:
29.5832 − .998

3. Multiply and round the answer to the nearest tenth:
29.64×18.2

4. Divide and round to the nearest hundredth:
$3{,}824 \div 4.94$

Complete by the shortcut method:

5. 17.48×100

6. $8{,}432 \div 1{,}000$

7. $9{,}643 \div 10{,}000$

8. Could you help Mel decide which product is the "better buy"?
Dog food A: $8.88 for 64 ounces **Dog food B:** $7.25 for 50 ounces

Round to the nearest cent as needed:

9. At Avis Rent-A-Car, the cost per day to rent a medium-size car is $29.99 plus 22 cents per mile. What will it cost to rent this car for two days if you drive 709.8 miles?

10. A trip to Mexico costs 7,000 pesos. What would this be in U.S. dollars? Check your answer.

INTERACTIVE CHAPTER ORGANIZER

Topic/procedure/formula	Examples	You try it*
Reading and writing numeric and verbal numbers Placement of digits in a number gives the value of the digits (Figure 1.1). Commas separate every three digits, moving from right to left, beginning to the left of the decimal point (if any). Begin at left to read and write number in verbal form. Do not read zeros or use *and.* Hyphenate numbers twenty-one to ninety-nine. The position (place values) of the digits to the right of the decimal point are shown in Figure 1.1 as well. To read or write decimal numbers, read it as if it were a whole number then use the name of the decimal place of the last digit given. Reverse procedure to change verbal number to numeric.	462 → Four hundred sixty-two 6,741 → Six thousand, seven hundred forty-one 8.39 → Eight and thirty-nine hundredths	**Write in verbal form** 571 → 7,943 → 10.65 →
Rounding numbers **1.** Identify place value of the digit to be rounded. **2.** If digit to the right is 5 or more, round up; if less than 5, do not change. **3.** Change all digits to the right of rounded identified digit to zeros. **4.** If the digit you want to round is to the right of the decimal point, drop all digits to the right of the identified digit after following Step 2 above.	643 to nearest ten 4 in tens place value 3 is not 5 or more Thus, 643 rounds to 640.	**Round to nearest ten** 691
Rounding all the way Round to first digit of number. One nonzero digit remains. In estimating, you round each number of the problem to one nonzero digit. The final answer is not rounded.	468,451 → 500,000 The 5 is the only nonzero digit remaining.	**Round all the way** 429,685 →
Adding whole numbers **1.** Align numbers at the right. **2.** Add units column. If sum is more than 9, carry tens digit. **3.** Moving left, repeat Step 2 until all place values are added. Add from top to bottom. Check by adding bottom to top or adding each column separately and combining.	$\begin{array}{r} {\scriptstyle 1} \\ 65 \\ +\ 47 \\ \hline 112 \end{array}$ $\begin{array}{r} 12 \\ +10 \\ \hline 112 \end{array}$ Checking sum of each digit	**Add** $\begin{array}{r} 76 \\ +38 \\ \hline \end{array}$
Subtracting whole numbers **1.** Align minuend and subtrahend at the right. **2.** Subtract units digits. If necessary, borrow 1 from tens digit in minuend. **3.** Moving left, repeat Step 2 until all place values are subtracted. Minuend less subtrahend equals difference.	$\begin{array}{r} {\scriptstyle 5\,18} \\ 6\not{8}5 \\ -492 \\ \hline 193 \end{array}$ **Check** $\begin{array}{r} 193 \\ +492 \\ \hline 685 \end{array}$	**Subtract** $\begin{array}{r} 692 \\ -134 \\ \hline \end{array}$

(continues)

INTERACTIVE CHAPTER ORGANIZER

Topic/procedure/formula	Examples	You try it*
Multiplying whole numbers **1.** Align multiplicand and multiplier at the right. **2.** Begin at the right and keep multiplying as you move to the left. First partial product aligns at the right with multiplicand and multiplier. **3.** Move left through multiplier and continue multiplying multiplicand. Partial product right digit or first digit is placed directly below digit in multiplier. **4.** Continue Steps 2 and 3 until multiplication is complete. Add partial products to get final product.	223 × 32 446 6 69 7,136	**Multiply** 491 × 28
Shortcuts: (a) When multiplicand or multiplier, or both, end in zeros, disregard zeros and multiply; attach same number of zeros to answer. If zero is in center of multiplier, no need to show row of zeros. (b) If multiplying by power of 10, attach same number of zeros to whole number multiplied.	a. 48,000 × 40 → 48 × 4 = 1,920,000 ← 3 zeros + 1 zero = 4 zeros 524 × 206 = 3 144 + 104 8 = 107,944 b. 14 × 10 = 140 (attach 1 zero) 14 × 1,000 = 14,000 (attach 3 zeros)	**Multiply by shortcut** 13 × 10 = 13 × 1,000 =
Dividing whole numbers **1.** When divisor is divided into the dividend, the remainder is less than divisor. **2.** Drop zeros from dividend right to left by number of zeros found in the divisor. Even division has no remainder; uneven division has a remainder; divisor with one digit is short division; and divisor with more than one digit is long division.	**1.** 5 R6 14)76 70 6 **2.** 5,000 ÷ 100 = 50 ÷ 1 = 50 5,000 ÷ 1,000 = 5 ÷ 1 = 5	**Divide** **1.** 16)92 **Divide by shortcut** **2.** 4,000 ÷ 100 4,000 ÷ 1,000
Adding and subtracting decimals **1.** Vertically write and align numbers on decimal points. **2.** Add or subtract digits, starting with right column and moving to the left. **3.** Align decimal point in answer with above decimal points.	Add 1.3 + 2 + .4 1.3 2.0 .4 3.7 Subtract 5 − 3.9 4 10 5.0 −3.9 1.1	**Add** 1.7 + 3 + .8 **Subtract** 6 − 4.1
Multiplying decimals **1.** Multiply numbers, ignoring decimal points. **2.** Count and total number of decimal places in multiplier and multiplicand. **3.** Starting at right in the product, count to the left the number of decimal places totaled in Step 2. Insert decimal point. If number of places greater than space in answer, add zeros.	2.48 (2 places) × .018 (3 places) 1 984 2 48 .04464	**Multiply** 3.49 × .015
Dividing a decimal by a whole number **1.** Place decimal point in quotient directly above the decimal point in dividend. **2.** Divide as usual.	1.1 42)46.2 42 42 42	**Divide (to nearest tenth)** 33)49.5

(continues)

INTERACTIVE CHAPTER ORGANIZER

Topic/procedure/formula	Examples	You try it*
Dividing if the divisor is a decimal 1. Make divisor a whole number by moving decimal point to the right. 2. Move decimal point in dividend to the right the same number of places as in Step 1. 3. Place decimal point in quotient above decimal point in dividend. Divide as usual.	14.27 = 14.3 2.9)41.39 29 123 116 79 58 21	**Divide (to nearest tenth)** 3.2)1.48
Shortcuts on multiplication and division of decimals When multiplying by 10, 100, 1,000, and so on, move decimal point in multiplicand the same number of places to the right as you have zeros in multiplier. For division, move decimal point to the left.	4.85 × 100 = 485 4.85 ÷ 100 = .0485	**Multiply by shortcut** 6.92 × 100 **Divide by shortcut** 6.92 ÷ 100

KEY TERMS

Addends
Decimal
Decimal point
Decimal system
Difference
Dividend
Divisor
Minuend
Multiplicand
Multiplier
Partial products
Partial quotient
Product
Quotient
Remainder
Rounding all the way
Subtrahend
Sum
Whole number

Check Figures for Extra Practice Quizzes with Page References. (Worked-out solutions in Appendix B.)

LU 1–1a
1. A. Eight thousand, six hundred eighty-two and fifty two hundredths; B. Fifty-six thousand, two hundred ninety-five; C. Seven hundred thirty-two billion, three hundred ten million, four hundred forty-four thousand, eight hundred eighty-eight
2. A. 40; B. 700; C. 7,000; D. 6,000
3. $3,000,000; $400,000

LU 1–2a
1. 26,090
2. 15,000; 15,953
3. 3,819
4. $43,100 (over)
5. 163,400,000
6. 33
7. $1,547,000,000

LU 1–3a
1. 44.5131
2. 28.5852
3. 539.4
4. 774.09
5. 1,748
6. 8.432
7. .9643
8. Buy A $.14
9. $216.14
10. $500.50

Note: For how to dissect and solve a word problem, see Learning Units 1–3.

*Worked-out solutions are in Appendix B.

Critical Thinking Discussion Questions with Chapter Concept Check

1. Explain how you can check multiplication. If you visit a local supermarket, how could you show multiplication as a shortcut to addition?
2. Explain how division is the reverse of multiplication. Using the supermarket example, explain how division is a time-saving shortcut related to subtraction.
3. Explain why .70, .07, and .007 are not equal. Assume you take a family trip to Disney World that covers 500 miles. Show that $\frac{8}{10}$ of the trip, or .8 of the trip, represents 400 miles.
4. Explain the steps in the addition or subtraction of decimals. Visit a car dealership and find the difference between two sticker prices. Be sure to check each sticker price for accuracy. Should you always pay the sticker price?
5. **Chapter Concept Check.** Visit a publisher's website and calculate the difference between the prices for a printed text and an e-book. Estimate what you think the profit is to the publisher based on your research.

END-OF-CHAPTER PROBLEMS

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Check figures for odd-numbered problems in Appendix C. Name _____ Date _____

DRILL PROBLEMS

Add the following: *LU 1-2(1)*

1–1. 88 + 75

1–2. 6,251 + 7,329

1–3. 59,481 + 51,411 + 70,821

Subtract the following: *LU 1-2(2)*

1–4. 68 − 19

1–5. 287 − 199

1–6. 9,000 − 5,400

Multiply the following: *LU 1-2(3)*

1–7. 60 × 7

1–8. 800 × 200

1–9. 677 × 503

Divide the following by short division: *LU 1-2(4)*

1–10. $9\overline{)810}$

1–11. $4\overline{)164}$

Divide the following by long division. Show work and remainder. *LU 1-2(4)*

1–12. $6\overline{)520}$

1–13. $62\overline{)8{,}915}$

Add the following without rearranging: *LU 1–2(1)*

1–14. 666 + 950

1–15. 1,011 + 17

Estimate the following by rounding all the way and then do actual addition: *LU 1-1(2), LU 1-2(1)*

	Actual	Estimate		Actual	Estimate
1–16.	7,700 9,286 + 3,900		**1–17.**	6,980 3,190 + 7,819	

Subtract the following without rearranging: *LU 1-2(2)*

1–18. 190 − 66

1–19. 950 − 870

1–20. Subtract the following and check answer: *LU 1-2(2)*

591,001
− 375,956

Multiply the following horizontally: *LU 1-2(3)*

1–21. 84 × 8

1–22. 27 × 8

Divide the following and check by multiplication: *LU 1-2(4)*

1–23. $45\overline{)876}$ **Check**

1–24. $46\overline{)1{,}950}$ **Check**

Divide the following by the shortcut method: *LU 1-2(4)*

1–25. $1{,}000\overline{)950{,}000}$

1–26. $100\overline{)70{,}000}$

1–27. Estimate actual problem by rounding all the way and do actual division: *LU 1-1(2), LU 1-2(4)*

Actual **Estimate**

$695\overline{)8{,}950}$

Identify the place value for the following: *LU 1-1(1)*

1–28. 7.9382

1–29. 462.8391

Round the following as indicated: *LU 1-1(2)*

Tenth **Hundredth** **Thousandth**

1–30. .7391

1–31. 6.8629

1–32. 5.8312

Round the following to the nearest cent: *LU 1-1(2)*

1–33. $4,822.775

Write the decimal equivalent of the following: *LU 1-1(1)*

1–34. Five thousandths

1–35. Three hundred three and two hundredths

1–36. Eighty-five ten thousandths

1–37. Seven hundred seventy-five thousandths

Rearrange the following and add: *LU 1-3(1)*

1–38. .115, 10.8318, 4.7, 802.4811

1–39. .005, 2,002.181, 795.41, 14.0, .184

Rearrange the following and subtract: *LU 1-3(1)*

1–40. 9.2 − 5.8

1–41. 7 − 2.0815

1–42. 3.4 − 1.08

Estimate by rounding all the way and multiply the following (do not round final answer): *LU 1-1(2), LU 1-3(1)*

1–43. 6.24×3.9

Estimate

1–44. $.413 \times 3.07$

Estimate

Divide the following and round to the nearest hundredth: *LU 1-3(1)*

1–45. $.8931 \div 3$

1–46. $29.432 \div .0012$

1–47. $.0065 \div .07$

1–48. $7{,}742.1 \div 48$